WORLD PETROLEUM

DECEMBER 1957

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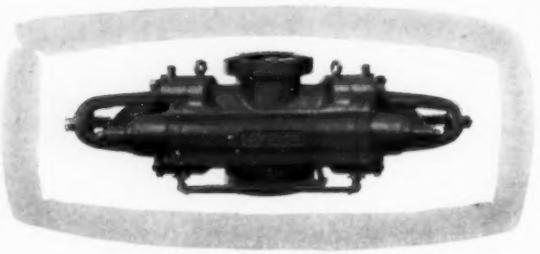

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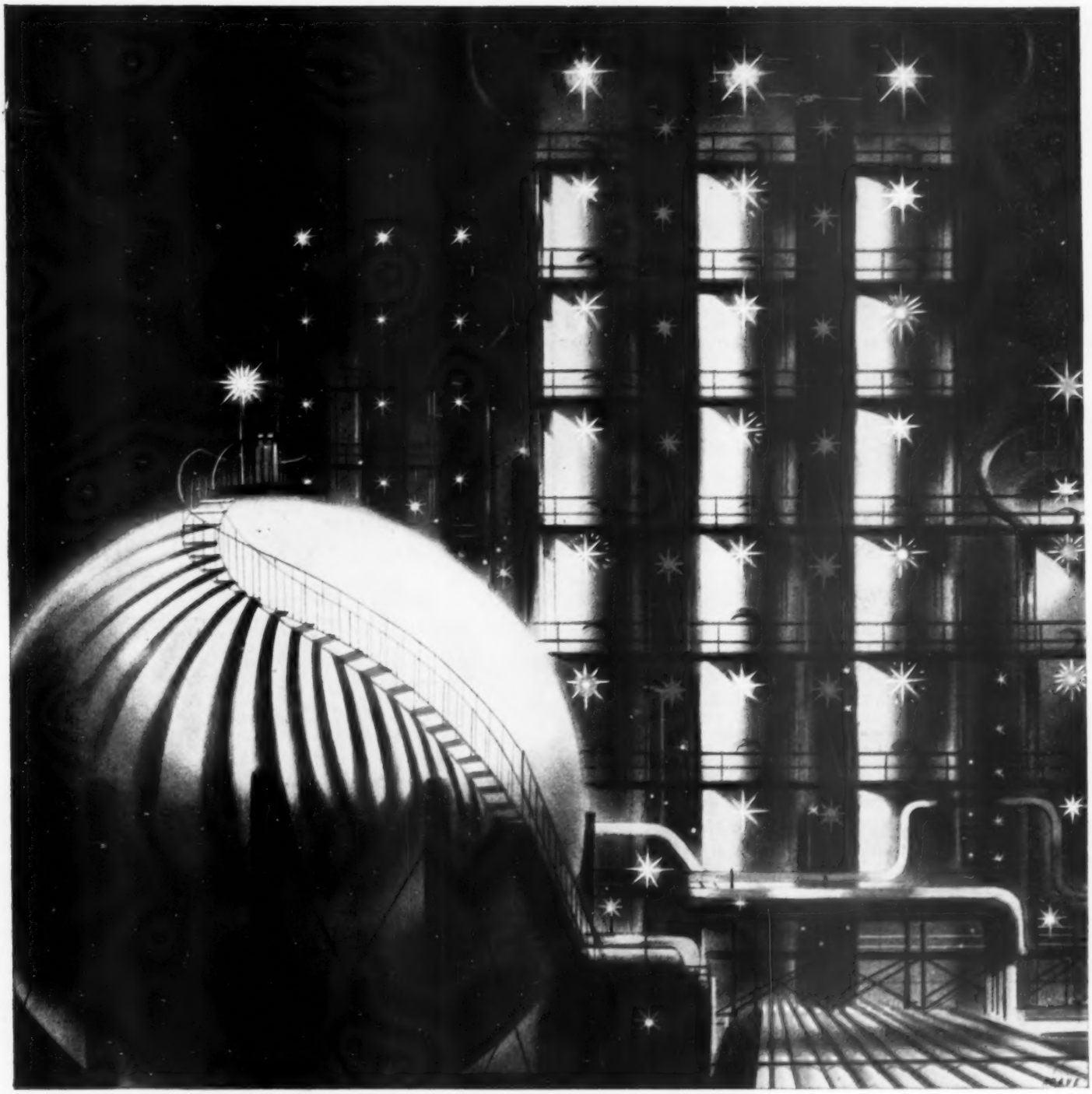

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VOL. 28, NO. 13 DECEMBER, 1957

World Petroleum

THE MANAGEMENT PUBLICATION OF THE INTERNATIONAL PETROLEUM INDUSTRY

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THIS MONTH'S COVER

A typical tank battery installation in the Shuler field of Union County, Arkansas. Photograph is by courtesy of Lion Oil Co., Division of Monsanto Chemical Co.

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A Delayed Coking Unit which handles the heaviest feed ever charged is now in operation at the new Yorktown, Virginia refinery of The American Oil Company.

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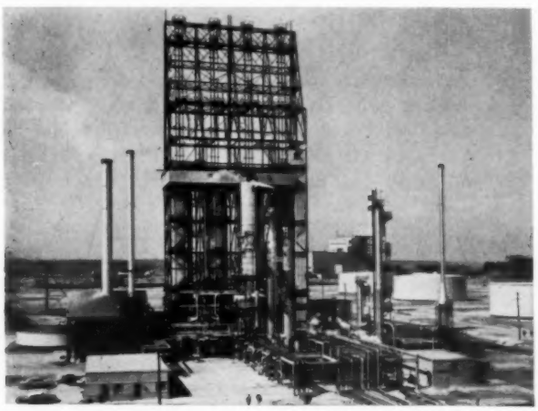
The fractionating tower produces light and heavy gasoline and light and heavy gas oils meeting all rigid Amoco specifications for the production of high octane unleaded gasoline. Coke produced meets client's specifications for pulverizing for use in boilers.



This delayed coker at Amoco's new Yorktown, Va. refinery handles the heaviest charge on record. Four coke drums measure 17'6" x 75' tangent to tangent. Refinery will help supply unleaded "Amoco-Gas" to an 18-state market.

Evaluation of charge stock in Lummus laboratories and pilot plants supplied the information for special design features that were incorporated into the heater—the heart of the process—and other critical equipment, to handle the heaviest charge stock on record. The unit was designed for a charge mixture of vacuum reduced crude with 25% Conradson Carbon, an API gravity of 6.1°, and an SFS viscosity of 6,000 at 210° F. It was also designed to process a variety of stocks at different recycle ratios to meet required flexibility.

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Lummus has designed much of America's coking capacity — 10 units — combined capacity of over 120,000 barrels per day.

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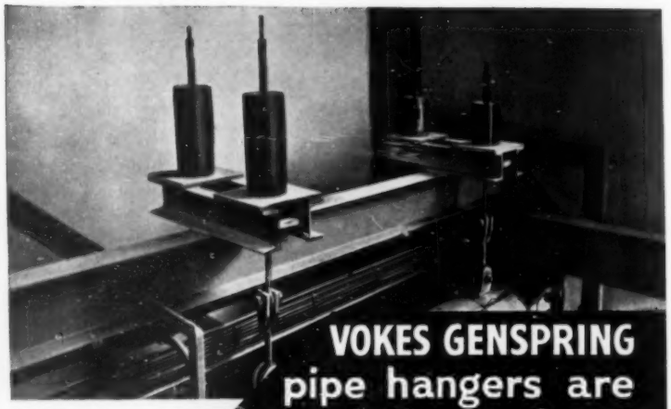
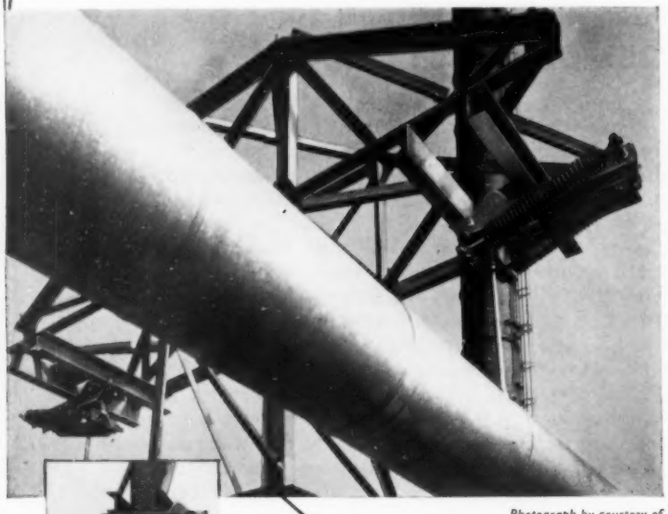


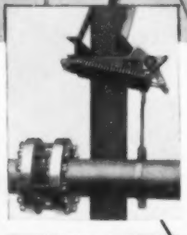
Photograph by courtesy of The Associated Ethyl Company Limited.

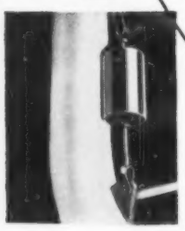
VOKES GENSPRING pipe hangers are used throughout the oil industry

At their Ellesmere Port Works in Cheshire, The Associated Ethyl Company Limited have made use of VOKES GENSPRING Variable Support Pipe Hangers to control movement which could set up very great stresses in the piping. 'Shell' have also incorporated VOKES GENSPRING hangers throughout the Platforming Unit at their Stanlow Refinery in Cheshire.



Photograph by courtesy of 'Shell'.





VOKES GENSPRING Variable Support Hangers are specifically designed for the control of vibration and limited thermal movement of piping, but where piping systems need to be 'floated' to offset the effects of extensive movement, Vokes Genspring Constant Support Hangers should be used. The full range is detailed in the Vokes Genspring catalogues available on request.

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VG11

Washington

By Joseph B. Huttlinger

Department of Justice's two-way antitrust action against oil pipe lines comes as little surprise to persons who have been watching the tough antitrust policy of the past five years.

DJ's filing of four motions alleging improper bookkeeping for purpose of dividends has long been expected as a step to have the courts clear up a complicated accounting problem of 16 years standing.

Full Scale Pipeline Quiz

Only surprise came in DJ's announcement of a "comprehensive" and "full scale" investigation of oil lines amid hints DJ may seek divorcement. If DJ does not seek to forbid majors to own pipe lines, it hints, it may at least try to forbid joint ownership of pipe lines, a common practice in the U. S.

DJ's pipeline moves are important because they could lead to sweeping changes some months or years off, and because they represent the first effort of the department to enforce the 1941 consent decree under which pipelines agreed to limit earnings to seven percent of valuation.

At that, the pipeline actions are more in a series of antitrust actions aimed at oil, both by headline hunting politicians, and a DJ that seems trying to beat Congress to the punch in "get oil" moves.

Here are a few examples:

A sweeping study of oil's prices and practices has been underway before a federal grand jury at Alexandria, Va., since last March, with months of work yet to come. This action was begun by DJ just before start of Congressional hearings into oil price rises at the start of this year, after the Suez crisis arose.

Further, DJ began grand jury study of fuel oil prices in the Washington, D.C., area, timed at the start of the heating season, perhaps to take the wind out of annual fuel oil price studies by Congressmen.

Finally, DJ moved on the heels of Roosevelt committee hearings into gasoline prices in near South Bend, Ind., and sought and obtained a price fixing indictment against nine major oil companies and five independent marketers. Companies are accused of getting together to raise prices, and thus end a price war.

DJ, meanwhile, has a hangover of oil cases before the courts, including the so-called "oil cartel" matter, the massive case against seven West Coast oil companies and the Sun Oil case at Philadelphia, which is near the decision stage and others.

PIPE LINE

Import Program Working

The program to limit crude oil imports to the United States is working, according to Capt. M. V. Carson, Jr., crude oil imports administrator, and Gordon Gray, defense mobilizer.

Figures from oil importing companies indicate it. How well it is working and for how long are something else. For the present, U. S. officials are quite satisfied.

How well is it working? Well, first quota for imports to the East Coast was 755,700 b/d, later raised to 766,400 b/d. Against this, crude imports were 846,000 b/d in July; 966,800 in August; and 782,500 in September.

Company plans add up to 792,000 b/d in December and 789,400 b/d for the five months October-February. So, it's over quota, but not too much over.

Mr. Carson praises companies which cut back to cooperate despite "hardships." He says Sun Oil Co. is the only one flatly refusing to take part.

Tidewater Oil Co. has refused to say what it would do, after being refused an increase from 34,000 b/d quota. Standard Oil Co. (Ohio) promised to comply through 1957, and Eastern States said it will try to handle its Middle East contracts to comply.

Mr. Carson has proven tough with requests for more quota. A famous line was his ruling it would hurt Tidewater no more to comply on a voluntary basis, than if the program became a mandatory one. Mandatory controls would come, he warned, unless the voluntary route works. So, only newcomers, mistakes in arithmetic and "unconscionable hardship" was given any relief from first quotas.

Mr. Carson's job is to hold the line for the months to come. To do so, he'll have full support of President Eisenhower. President is well aware that unless domestic producers are given relief this way, they may go to Congress and wreck the whole reciprocal trade agreements program, which is up for extension next year.

Mr. Carson is closely watching oil products and residual oil. He wants to make sure extra oil is not brought in this way to "get around" the program. And, Office of Defense Mobilization is checking up on residual fuel imports, after coal men complained they are too high.

Rogers Has Oil Plans

William P. Rogers, the new attorney general, plans to carry on the same general program of law enforcement as the man he replaces—Herbert Brownell, Jr., it was disclosed.

He plans to continue the comprehensive study of oil pipe lines and the antitrust laws, which was disclosed by his antitrust chief, Victor R. Hansen. He plans to push ahead with the grand jury investigation of oil at Alexandria, Va., and with cases against West Coast majors, Sun Oil & Philadelphia, 14 companies at South Bend, Ind., Socony Mobil Oil Co., at Boston, and fuel oil dealers at Washington, D.C.

Worthington Boiler Feed Pump provides more than 50,000 hours of service without overhaul or failure

In 1947 a Worthington high pressure boiler feed pump was installed at the Gennevilliers Station of Electricité de France, located on the banks of the Seine near Paris. Since then, the pump has provided continual service for more than 50,000 hours without failure or overhaul.

Electricité de France is unique in that it is the nationalized electric power supplier and distributor in France. The Worthington pump, installed by Société Worthington, was chosen because of Worthington's reputation for flexibility, economic operation and dependability.

Superior features of Worthington Boiler Feed Pumps:

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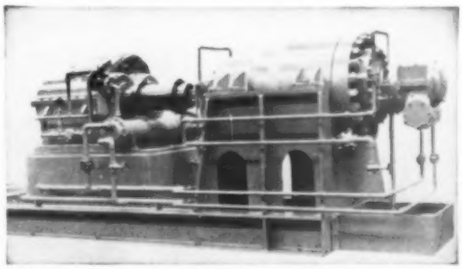
Impellers are shrunk on, keyed to shaft
Hydraulic pressure acts to seal, rather than open joints
Inner assembly firmly anchored at inboard end but is free to expand at outboard end with temperature changes
Vernier jackscrews at each end facilitate final adjustment



8-WCS high pressure barrel type boiler feed pump as used in the Gennevilliers Station.

• • • •

For information on Worthington Centrifugal Boiler Feed Pumps, contact your nearest distributor or write to Worthington Corporation, Department O. C., Harrison, N. J., U.S.A.

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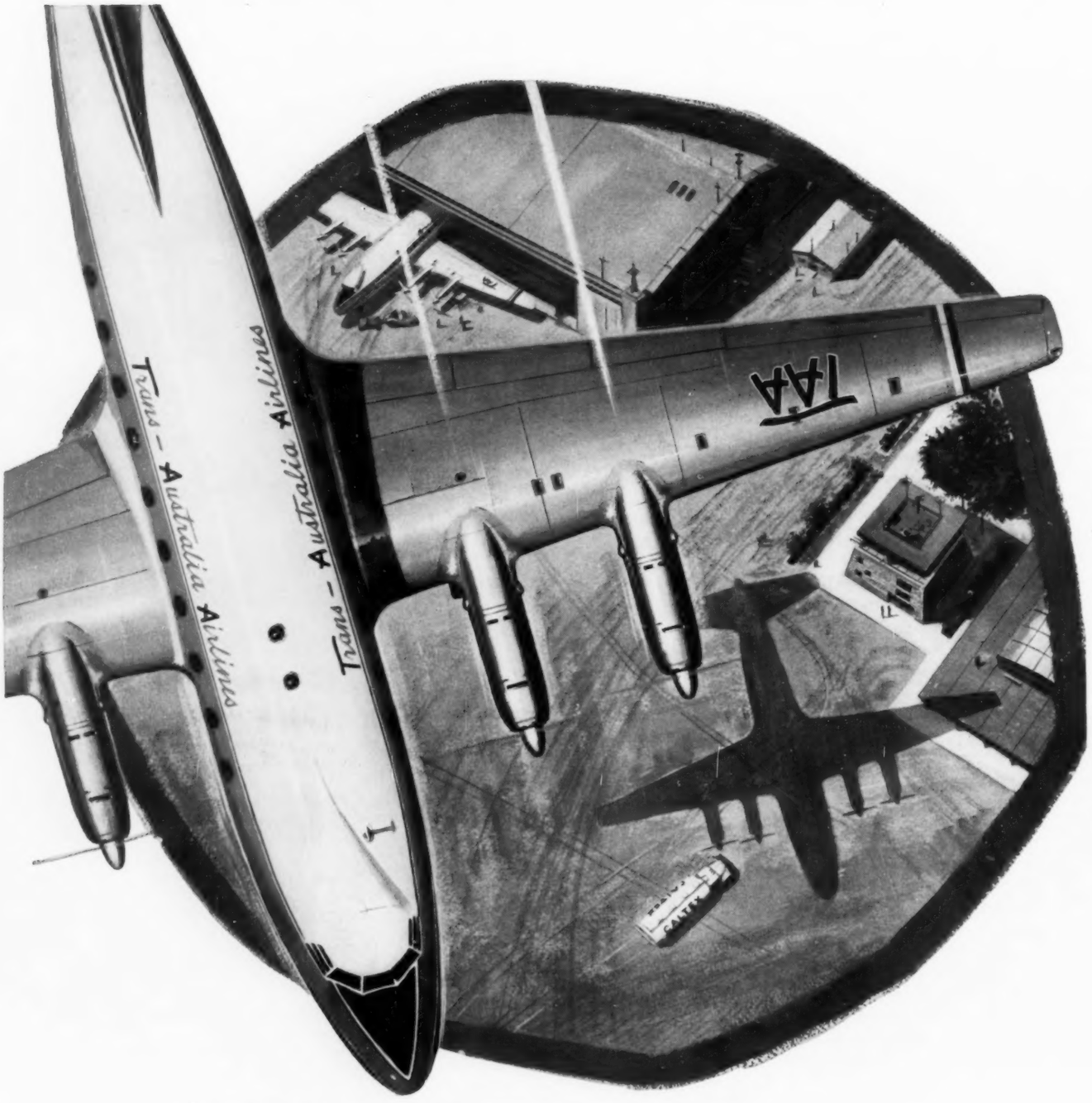

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Centuries ago, plodding caravans formed the link that joined peoples, made nations great ☆ Today a new dimension in transportation—the air—has shrunk distances, brought the citizens of the world closer ☆ By touching down at modern oases for refueling, giant transports traverse the earth, bringing increased commerce and other advantages of the air age wherever they go ☆ Progressive airlines know that quality petroleum products are indispensable for economical, dependable operation ☆ Caltex aviation fuels and lubricants send perishable cargoes to market... machine parts to industry... passengers to far-off places—faster than ever before ☆ Through the power of petroleum, Caltex is playing its part in establishing a new pattern of prosperity in over 70 countries—partner in progress in Europe, Africa, Asia, Australia and New Zealand.

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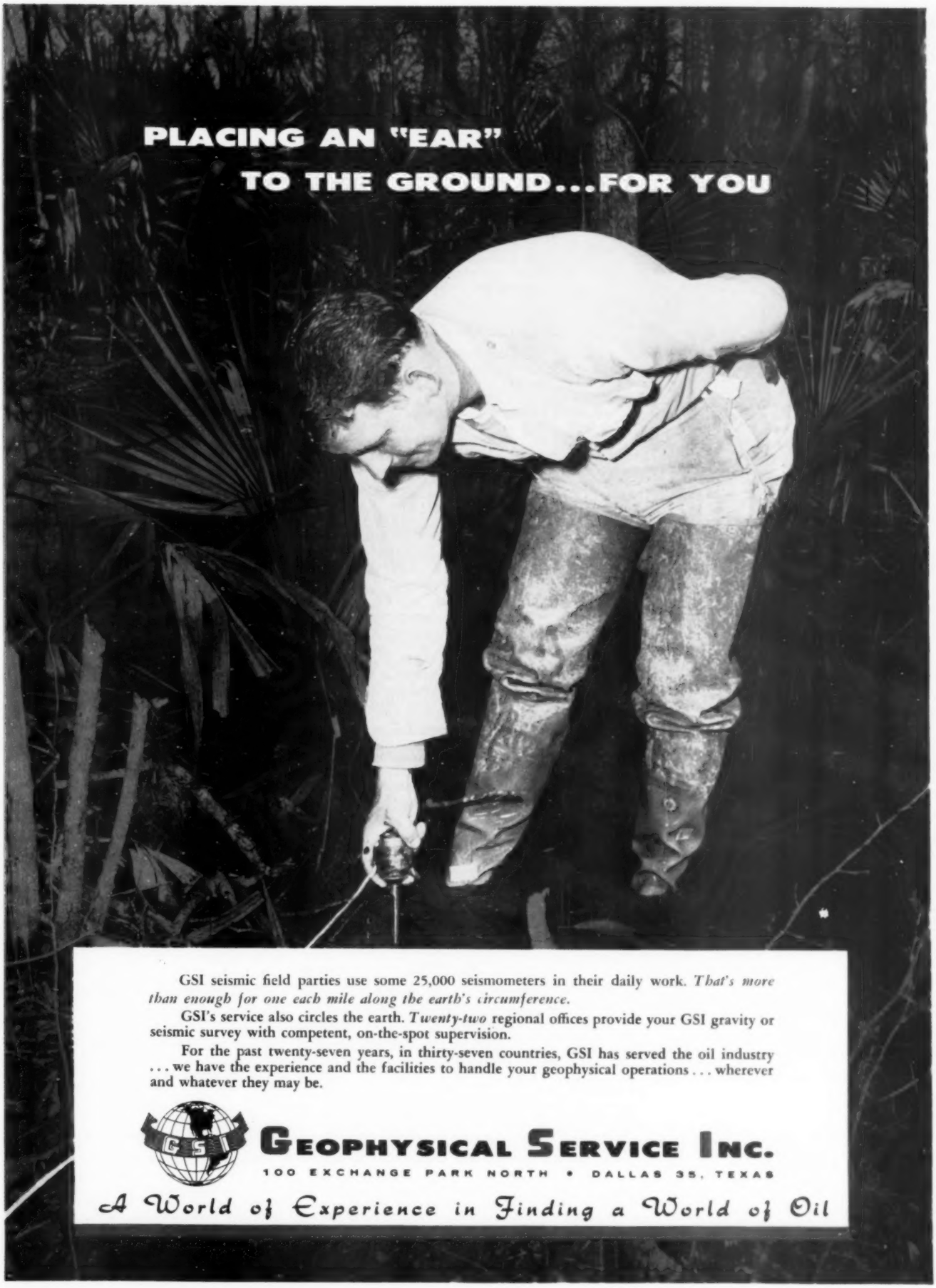
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Canadian Notes

$670 Million for Alberta Oil

The Alberta government is well on its way to topping the estimated $60 million expected to be taken in from sales of oil and gas rights during the current fiscal year ending March 31.

In the third major sale of the fiscal year, which began April 1, the government received approximately $14,186,000. This brought to more than $50 million the total thus far in the fiscal year. The budget estimate of $60 million for the entire fiscal year now seems extremely conservative.

In the latest sale, held Oct 16 in Edmonton, four reservations in the northcentral and northwestern regions of Alberta drew the highest bids. These bids totaled $5,938,290. These included a joint bid by Pan-American Petroleum and Imperial Oil Ltd., amounting to $3,903,566 for a 98,726-acre parcel in south Clear Hills area of Northwestern Alberta. Four companies (Texas Pacific Coal and Oil, Pure Oil, Bailey-Selburn Oil and Gas and Richfield Oil Corp.) teamed to pay 25% each for 97,920 acre reservation in the same general region. Total price was $1,057,256. Imperial Oil bought two parcels in the same region, paying total $977,468 for total acreage of 195,339 acres.

Acreage offered in the Pembina field brought in $4,888,602. Parcels in other proven fields brought $1,694,170 and wildcat offerings brought approximately $1,665,000. Sixteen Pembina parcels were sold. Highest single price for a Pembina parcel was paid by Plymouth Oil. This was $628,945 for 1,601 acres.

Since the Leduc discovery in 1947, the Alberta government has received $670 million from oil and gas sources.

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Trans-Canada Investigation

Investigation into operations of Trans-Canada Pipe-line as part of a thorough investigation into Canada's national energy problems will be made by a six-man Royal Commission by order of the new Conservative government. The Commission will be headed by Toronto industrialist Henry Borden, Q. C.

The Commission has been instructed to take into consideration the "nature of Trans-Canada's financing and control" during the course of investigations to determine whether "any special measures need to be taken in relation to Trans-Canada Pipelines Ltd., in order to safeguard the interests of Canadian producers and consumers of gas."

The 3,100 mile west-east gas pipeline was loaned $80 million by the Liberal government during financial difficulties, and accordingly, became a center of political controversy by rival political parties in Canada. Stock held by U. S. interests in the company, prices paid producers and rates set for consumers have been particularly hot political issues fought out by Liberal and Conservative leaders.

Large Canada Gas Area

An 80,000 acre farmout held by Jefferson Lake Suphur Co., oil and gas division, Tulsa, on the northeast outskirts of Calgary shows indications of becoming one of the largest single gas producing areas in Canada to date, estimated in excess of two trillion cubic feet.

Jefferson Lake released this estimate in announcing completion of North Calgary CPR No. 25-11 as the largest producer to date in the area with an open flow potential of 50 million cubic feet per day in the Crossfield formation at intervals 8606-8717. It confirms a proven area of approximately 10,000 additional acres of leases controlled by the company on farmout from Mobil Oil of Canada Ltd. As previously announced, Jefferson Lake plans construction of a large sulphur plant in the area. Gas will be sold to Westcoast Transmission Co., Ltd.

The Alberta Gas Trunk Line Co., Ltd., will build and operate the approximate 400-mile Alberta section of the proposed 1,300-mile Alberta to California natural gas pipeline, provided backers of the $330 million project receive necessary governmental permits. Announcement was made in Calgary by J. C. Mahaffy, general manager of Trunk Line, and J. K. Horton, president of Alberta and Southern Gas Co., Ltd., subsidiary of Pacific Gas and Electric, San Francisco.

Officers of both companies stated that preliminary cost estimates and engineering design have been completed. They now are under review. The Trunk line company would build the line over routes to serve requirements of all local and export markets as well as requirements of Alberta and Southern.

Alberta Production Down

For the first time since before the Leduc discovery, Alberta crude production will probably be down in 1957 from 1956, because of reduced export markets and overestimate by domestic refineries of fall demand. Projected total is 143,250,000 bbl, against 143,909,641 bbl last year. Western Canada total looks like 187 million bbl, against 171 million in 1956, due to Saskatchewan growth.

Westcoast to Double

Westcoast Transmission Co.'s $100 million natural-gas pipeline through British Columbia is expected to be doubled within the next few years as an expensive though logical step in western Canada's gas export picture. Westcoast president Frank McMahon, of Calgary, forecast the huge expansion project of the 650-mile line from Taylor Flats, B.C., to Huntington, B.C. This expansion would involve construction of a second pipeline parallel to the existing line and passing through the same compressor stations. This would be in addition to current plans to boost capacity from the present 400 mmcf per day of gas to 660 mmcf at a cost of approximately $70 million.

In pointing out that market prospects for Peace River gas are "very good," Mr. MacMahon commented that "looping the line will be an expensive proposition, but it's our logical next stage."

Alberta Market Low

Markets for Alberta crude oil are still very soft and not expected to show much improvement for November over the near-record low of 310,000 b/d in October. Overstocks of Ontario gasoline, short grain harvest on prairies, and continued lack of exports are main factors. November and December averages expected to be well under 400,000 b/d, with Saskatchewan and Manitoba producing about 125,000 b/d for all-Canada total of around 500,000 b/d.

BC Gas Contract

In a surprise announcement at the official opening of Westcoast Transmission Co. Ltd.'s natural-gas pipeline, in Vancouver, B.C., October 8, President A. E. Grauer of British Columbia Electric Co. Ltd. said that his company has signed a supplementary contract for a maximum of 144 mmcf per day to start in 1961, for fueling of thermal electric generating stations. B. C. Electric is the largest single customer of Westcoast in Canada.

Manitoba Drilled Up

Development drilling in Manitoba is almost completed, unless another discovery is made. Only a few locations on the fringes remain to be drilled out in the three major fields at Virden, although there may be some additional locations in Routledge field to the southeast. Projection for 1958 is fewer than 100 wells, wildcat and development combined, less than half the expected 1957 total.

COC Expands Refinery

Canadian Oil Companies Ltd. plans an 8 million expansion program at its refinery near Sarnia, Ont., through which capacity will be boosted to 50,000 b/d from 30,000 b/d.

The project was announced by W. Harold Rea, company president, in an address in October before the Security Analysts' Assn., in Toronto. Work will start immediately.

New Alberta Production Area

Production from Alberta's new Innisfail producing area, 60 miles north of Calgary, is headed for market via a newly constructed spur line to tap the region where reserves have been estimated at approximately 50 million barrels of oil. Estimates of reserves in the active Innisfail area were released for the first time in October by W. Harold Rea, president of Canadian Oil Companies Ltd., in stating that the company's Devonian reef Innisfail discovery should double Canadian Oil's total crude-oil reserves. He estimated that Canadian Oil's share of the reserves would amount to 18 million barrels of oil.

Rangeland Pipeline Co., a subsidiary of Houston's Bay Oil and Gas Co. Ltd., plans to complete construction of a 19-mile 8-in. main line spur to the field by Nov. 1. The extension, including 4 miles of lateral lines, will cost about $270,000. It will intersect existing lines to the Edmonton terminals of Trans-Mountain and Interprovincial pipelines. Hudson's Bay is among numerous companies with interests in the region.

New Northern Terminal Complete

A new $2 million oil terminal has been completed at Churchill, on Hudson Bay, Canada. Capacity is not revealed, but will be sufficient for military use and may be expanded to meet civilian requirements, if needed. A 5-mile pipeline to the nearby army base will be constructed shortly.

• • •

Canada's Pembina Gas Contract

Alberta & Southern Gas Ltd. (subsidiary of Pacific Gas & Electric, San Francisco) is contracting for 27 years with producers for all the natural gas in Alberta's Pembina field. Until completion of 1,300-mile Alberta-California line, gas will be sold to Northwestern Utilities Ltd. which will build a 75-mile 6-in. link to its Edmonton distribution centers. Buying of gas should begin October 1958.

When you make your derrick man reach out and wrestle the elevator with every stand of pipe, you are wasting drilling time and money . . . and sacrificing safety.

If you don't have a Hook Positioner you're sacrificing Time, Money and Safety!

Here's where Byron Jackson's *exclusive* hook feature pays off. The BJ Hook Positioner automatically rotates the elevator into the correct position for the derrick man. Elevator handles and door are ready for instant, easy latch-on. There's no groping, grabbing and griping.

The BJ positioner consists of a cam follower which travels on a hardened cam track. The cam follower may be set and locked in any of 24 regular positions. Whenever the load is released from the hook, the cam follower travels upward until it contacts the cam surface on the housing. It then automatically travels on the cam surface and rotates the hook body to the predetermined position. This accurately locates the elevator door handles so that the derrick man can quickly, easily and safely latch-on the next stand.

Don't make a monkey out of your derrick man. Make your next hook a BJ Hook with *exclusive hook positioner*. You'll save money . . . with safety!

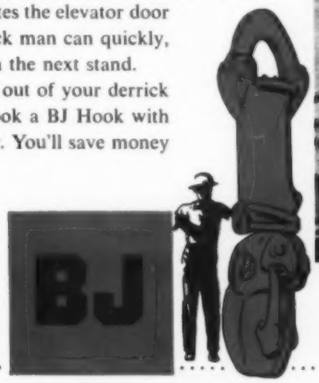
Here's How It Works!

Elevator at monkey board has door handles perfectly positioned for derrick man to load stand.

Going in hole, conditions such as crooked hole, bridges, etc. rotate hook body and elevator.

At rig floor, slips take load and BJ Positioner automatically rotates hook body to pre-set position.

Elevator is fully re-positioned into correct working position—for elevator opening at floor and for instant latch-on at board.



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Latin American Oil News

New Intn'l Concession Co.

A new oil company, Pan American Land and Oil Royalty, has been formed to acquire oil and gas concessions in foreign countries.

The company has concession rights covering approximately 1,300,000 acres in Cuba, plus a 1.3% overriding royalty on approximately 15,000,000 acres and a 1% overriding royalty on approximately 4,200,000 acres. DeGolyer and MacNaughton, Inc., geological and engineering consulting firm will direct exploration.

W. Rufus Brent is vice president, the board of directors consists of Ralph Bard, president of Chicago-Canadian Holdings, Ltd., Chicago, Ill.; Guillermo Belt, former Cuban Ambassador to the United States, Havana, Cuba; and H. N. Mallon, chairman of the board, Dresser Industries, Inc., Dallas. Also F. Lee Moore, Jr., an associate of Kidder, Peabody & Co., investment bankers, New York City; and Jay H. Schafrann, a partner of the New York City law firm, Arismendi, Brigard & Parraga are included.

Current working capital is $1 million.

Cuban Farmout

Consolidated Cuban Petroleum Corp. has signed a farmout agreement with Dr. Antonio Iglesias, representing Cia. Petrolera Banes-Habana SA. Dr. Iglesias has agreed to drill 4 wells of 4,000 ft each in each of the El Salado, Baracoa, Elia, and Esperanza concessions. At the completion of the four wells, Dr. Iglesias will have earned a 50% interest in the area, which totals about 50,000 acres. Any petroleum obtained will be divided on an even basis after the payment of royalties. The first well will be located in the Esperanza concession, which is the oldest of the four concessions, and is expected to be started within 30 days.

Brazil Activities

Rigs operating in Brazil in Sept. totaled 51. Crude production, Jan. through July, averaged 23,247 b/d; Aug.-Sept., 27,000 b/d. Wells active in Sept. numbered 147.

Petrobras estimates Bahia crude production will average 200,000 b/d this year. Reconcavo reserves are estimated at 346 million barrels.

Stratigraphic test AIST-1-AZ was begun in Aug. on Acari River—with preparations for two more wildcats—one on Urubu River and another in Acari area.

Two new structures have been located on Maues and Mamuru Rivers, where activity is shifting from Nova Olinda.

Two new rigs have been landed at Belem, Para—with five others to arrive. Drilling has started on Maraca Island No-5-Az, 5th wildcat in Nova Olinda. New drilling sites are at Sampaio (Amazonas), on Canuma River; and at Oriximina (Para) at mouth of Trombetas River.

Bolivia-Brazil Dispute Oil

The "Subandine" zone of joint Brazil-Bolivia exploration has still not received attention, and negotiations have collapsed. It was granted Brazil in 1938, and lies wholly within Bolivia. The understanding was that exploration would be done by Brazil, but none has been done. Bolivian law forbids government's holding exploration rights, so Petrobras has not been able to explore, and lacks financial resources in any case.

Pure Oil in Paraguay

The Pure Oil Co. has obtained a 23,000-square-mile exploration concession in Paraguay, in the Chaco territory bordering Bolivia. Investment in the next four years is to be $6 million. Standard of California is reported seeking a similar Chaco concession.

Venezuela Drilling Consortium

Paria Operations Inc. is name of five-company consortium to operate 152,000-acre Gulf of Paria concession between Venezuela and island of Trinidad. Companies include Texas, Continental, Ohio—each 25% interest; Cities Service, 16⅔%; Richfield, 8⅓%. With four platforms in the area, first exploratory well was planned for mid-October.

GSI Appointments

Geophysical Service Inc. has prompted several appointments in supervisory personnel in Latin America. G. J. Kohler, Jr., has been named manager of Latin American operations. Rodolfo Martin will direct GSI operations in Mexico; C. J. Spivey will remain in Caracas as manager of Venezuelan operations. P. S. Stoutjesdyk, in Rio de Janeiro, will manage Brazilian operations. H. L. Heggy and P. E. Swensen will be supervisors in Brazil. GSI's Andean operations will be managed from Lima, Peru, by D. W. Rockwell, with Murrell Holbert as supervisor in Bogota, Colombia.

Venezuela Shell Promotions

Compania Shell de Venezuela Ltd. has just announced the promotion of three executives to new posts.

Dr. Jose Antonio Giacopini Zarraga, former head of public relations, has been named assistant to the president of Compania Shell de Venezuela Ltd. Dr. Rapael Morello C. was appointed manager of general affairs. Until recently, he has been field superintendent.

The new head of public relations is Dr. Cesar Miguel Rosales W., who had been assistant superintendent in the La Concepcion district until this year.

No Shows in Nicaragua

Waterford Oil Co. has ceased drilling off the coast of Nicaragua. Waterford, in the wildcat operation with J. Ray McDermott Drilling Co. of New Orleans and a subsidiary of the Gulf Oil, reports that at slightly over 15,000 ft no encouraging signs had been found although considerable gas pressure was encountered. The location is approximately forty miles from the Caribbean port of Puerto Cabeza near the Moskito Cays.

Officials would not disclose their future plans although previously it had been reported that they intended to explore the entire structure in the area.

Meanwhile, a petroleum law has been prepared and submitted to the Nicaraguan Legislative Assembly. The new legislation is based on the Peruvian oil law. It has government backing and speedy approval is expected, official sources state. Until it is passed, no further exploration and exploitation concessions will be granted in Nicaragua.

Cuba Well by Atlantic

The Atlantic Refining Co. will shortly begin the drilling of a wildcat well in the Pinar del Rio Province of Cuba. Located near the town of Los Palacios some sixty miles southwest of Havana, the well is expected to reach a depth of approximately 9,000 ft. This is the first of a series of tests on Atlantic's substantial full interest holdings in Pinar del Rio Province after completing extensive seismic exploration during the past year.

New Refinery in Guatemala

The Breaux Bridge Oil Refining Co. of Louisiana has applied to the Director General of Mines and Hydrocarbons for a permit to install a refinery on Guatemala's Caribbean coast at the Port of Santo Tomas.

The company proposes to install a refinery which will handle 2,500 b/d of crude. The company now operates a refinery in the State of Louisiana. No estimate of the investment to be made in Guatemala has been made public.

Initially, crude will be forwarded from Venezuela for refining, it has been announced. However, it is understood that the company anticipates the discovery of oil in commercial quantities in Guatemala in the future and wants to be in the position of being in a position to refine such oil.

Uruguay Refinery Runs Up

Crude runs to stills in Uruguay totaled about 21,478 b/d during the first half of 1957. This is a slight increase over the same period in 1956.

Brazil Exploration Up 30%

Petrobras drilled 234,267 ft of hole in 1956, up 30% over 1955. 47 wells were completed, against 70 in 1955. Discovery rate was 68%. At the first of this year, there were 328 oil producing wells, 34 gas producers, 131 dry holes, and 64 stratigraphic wells.

29 geological field parties were operating. Production in Bahia was up to 11,197 b/d in 1956, most of it from Candeias field (37.4%) and Agua Grande (38.6%).

Dr. Rapael Morello C.

Dr. Jose Antonio Giacopini Zarraga

Dr. Cesar Miguel Rosales, W.

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London Letter

Increase in UK Oil Consumption

The Petroleum Information Bureau announces that there has been considerable recovery in UK oil consumption during the second quarter of 1957—being only 2.2% down from the consumption during the similar 1956 period, whereas first-quarter consumption was 14.7% less than that of the first quarter of 1956. The global consumption of 11,540,885 tons in the first half of 1957, against that of 12,640,199 in 1956, shows a fall of 8.7%.

This improvement in the second quarter of 1957 resulted from the reopening of the Suez Canal, the partial opening of the IPC pipelines in Syria, and the rescinding of the one shilling per gallon temporary duty imposed on motor gasoline. During the first quarter of the year, while this duty was effective, the decrease in composition, compared with the first quarter of 1956, was 29.7%. The global consumption of the first half of 1957 equaled 2,523,126 tons, compared with 1956 first-half 3,064,883 tons—equal to 17.7% loss.

In spite of rationing—improved prior to the reopening of the Suez Canal—the consumption of fuel oil was 2.4% higher in the 2nd quarter of 1957 than in the similar 1956 quarter. Total consumption of gas, diesel, and fuel oils (including refinery consumption) was 5,265,119 tons, against 5,651,367 tons in 1956, a fall of 6.8%.

The consumption of kerosine as burning oil fell, compared with 1956, but that was partly accounted for by the extremely mild spring. Vaporizing kerosine showed very little change.

BP's New Tanker Jetty at Finnart

The oil terminal at Finnart on Loch Long, Scotland, began operations in 1951, as a reception basis for crude oil for the Grangemouth refinery, the connecting link being a 57-mile pipeline.

The first tanker jetty was built to accommodate the largest tankers then in operation, and its capacity was sufficient to supply the requirements of the Grangemouth refinery with its capacity of 2.2 million tons per year. This capacity has been raised to 3.1 million tons; so the new jetty is required.

Construction of this new jetty has commenced at a site about half a mile south of the present jetty and, when completed, will accommodate any of the largest tankers under construction, as there will be a low-water depth of 55 ft. It is being constructed with concrete decking on steel piles, and will have two shore arms, each 180 ft long. One of these shore arms will serve as a pipe track, and the other as a roadway for light vehicles. The jetty head will be 300 ft long.

Four large new storage tanks are being erected which will be connected to the jetty head by two 24-in. pipelines, so a discharge rate up to 6,000 tons of crude oil per hour can be achieved. The tanks will also be linked to the present pipeline pumphouse. This extension work is scheduled to be completed by the fall of 1958.

Report on Canada

A comprehensive brochure has been published by the Council of British Manufacturers of Petroleum Equipment, which gives a report of the various findings of the recent good-will mission to Canada. In its 47 pages, it gives a wealth of information about Canada and its oil fields and oil industry, not found elsewhere in so handy a condition. Of particular interest the petroleum industry and makers of plants for that industry, is the complete tabular description of the various oil fields of Canada under such headings as: fields; average depth of the main producing zones; approximate developed areas, in acres; estimated recoverable reserves; cumulative production in barrels (USA); proration rate of individual wells; numbers of operating wells; gravity of crude in degrees API.

The brochure also lists some 31 oil companies, 7 pipeline companies, and 24 consultants and contractors.

G. B. Reid

Personnel

Mobil Oil Co. Ltd. reports that Bryce Cousens, who has been Mobil's western automotive division manager for two years, has resigned from the company. His successor is G. B. Reid, who joined Mobil in 1925 as a junior at the head office in London, and has served in many of the company's branches in various parts of the country.

New Type Waste-heat Boiler

Designed by Shell's engineers and constructed by John Thompson, Wolverhampton, a new type waste-heat boiler has been installed at the Stanlow refinery. This boiler uses mainly gases from the regenerator section of the cat cracker, which were formerly vented to the atmosphere. These gases are now transfered at the high temperature of the reactor, designed to stand high temperature and erosion by particles of catalyst, to a specially designed burner leading to the boiler, where they are at an increased temperature due to complete combustion, and used for raising steam. It is estimated that the heat recovered by this method will result in the saving of about 100 tons of heavy fuel per day.

Milford Haven

The development of Milford Haven as a petroleum center is commencing with the start of the preliminary work on British Petroleum Co.'s new crude tanker terminal at Popton Point on the south shore of Milford Haven, Pembrokeshire—which has followed the receipt of the royal assent to the parliamentary bill on the project.

One of the great advantages of Milford Haven is the depth of sheltered harborage there. The tanker jetty, which will be concrete-decked, will have a 1,350-ft shore arm, and the sea arm at right angles will be 2,300 ft long—allowing two supertankers to be berthed simultaneously, the depth at low water being almost 55 ft. Onshore, a tank farm of 220 acres will enclose eight 20,000 bbl crude storage tanks; there also will be five other tanks for the storage ships' bunkers of various grades and fresh water.

From the tank farm, the crude will be pumped through a 60-mile pipeline to the BP refining at Llandarcy. The contract has not yet been bid for the building of the jetty, but tenders for it have been invited.

On the other side of the Haven, Esso is still awaiting the result of the inquiry, which was held July, regarding the erection of its proposed 110,000 b/d refinery.

New Multigrade Oil by Shell

New Shell X-100 multigrade 20w/40 oil is designed especially for the motorist (and motorcyclist) who normally uses 40 grade and for those who prefer a 40 grade to a 30 grade. It will also appeal to the driver of the "not-so-new" car, where oil consumption, due to engine wear, may be high. It is retailed at the same price as Shell X-100 multigrade 10w/30.

Tanker News

Hawthorn Leslie (Shipbuilders) Ltd. report that the 18,000 dwt S.S. tanker "HALIA," built for the Shell Tanker Co. Ltd., was successfully launched at Hebburn Shipbuilding Yard.

Harland and Wolff Ltd. have launched the 32,000 dwt S.T. tanker "BRITISH HONOUR," built to the order of BP Tanker Co. Ltd., from the Belfast Yard. This was the fifth 32,000 dwt tanker launched in 1957 for BP Tankers Ltd.

Kockums Shipyard, Malmo, Sweden, has announced the 24,750 dwt S.T. Tanker "GEFION," built for Tankorederiet Gefion A/S, Oslo, has been launched.

Fredriksstad Mek. Verksted, Fredrikotad, have launched the 20,000 dwt motor tanker "STORVIKEN," built for Wallem, Steckmest & Co. A/S, Bergen.

Gotaverken, Gothenberg, Sweden, has delivered the 30,020 dwt motor tanker "INGER KNUDSON," built for Knut Knutsen OAS, Haugesand, Norway.

Shell Maritime has announced it has ordered three 75,000 dwt tankers from Chantiers de l'Atlantique (Peuhoct-Loire), St. Nazaire, which will take some five years to build.

First Canadian Sulfonate Plant Onstream

First Canadian chemical processing plant for production of petroleum sulfonates has been placed in operation by Surpass Petrochemicals Ltd., Scarborough, Ontario, Canada. The new $750,000 plant will produce 7 million pounds per year of oil-soluble sodium sulfonates, and is equipped also to make other petroleum sulfonates such as those containing lithium, calcium, barrium ammonium, or amine. Plant was designed and engineered by The Girdler Co., a division of National Cylinder Gas.

The primary sulfonation reaction takes place in a Votator multiport injection reactor a specialized heat-exchange unit produced by Girdler in Louisville, Ky. Primary sulfonation, sludge separation, neutralization, and stripping are continuous; while the remaining steps are batch operations. Like most chemical processes, most of the equipment in the plant is used for separation of unwanted byproducts and purification after the essential sulfonation and neutralization have been accomplished.

Canadian Oil Ltd. Expands

First fully-integrated Canadian-owned oil company—Canadian Oil Companies Ltd.—has nationwide plans for further development, according to W. Harold Rea, president. He has announced an $8 million expansion of the company's Sarnia refinery. Built in 1952 to refine 20,000 b/d of crude, the refinery has already expanded to 30,000 b/d. In order to meet the indicated rise in consumption of petroleum products, a building program to further increase the capacity of the company's refinery to 50,000 b/d will be undertaken immediately. The first step will be the erection of a 20,000 b/d crude distillation unit, scheduled for completion early in 1959 at a cost of $4 million. The remainder of the expansion program is expected to be completed by 1961.

Canada Gas To Reach 800 MMCF

Natural gas from Peace River regions of Alberta and British Columbia started serving the B.C. interior and northwestern USA areas through the 750-mile length of the Westcoast Transmission Co. system, Oct. 7, when opening ceremonies were begun by B.C. Premier W. A. C. Bennett. First deliveries were 125 mmcf daily, to be raised Nov. 1 to 350 mmcf. By 1st of 1958 flow will increase to 440 mmcf, its actual initial capacity. Compressor stations now building to raise capacity to 660 mmcf and construction of a parallel line during the next few years should raise ultimate daily capacity to 800 mmcf.

Canada First

Indications that the Canadian market will greatly exceed all previous expectations calls for a "Canada first" policy in natural-gas utilization, according to A. P. Craig, vice president of Trans Canada Pipe Lines Ltd. Unlike water power, he says, natural gas is not a recoverable resource.

Camels and
CATALYSTS
"When I die, my sons," said the old Arab sheik, "you, Ibrahim, will receive half of my property. You, Abdul, will receive one-third, and little Omar, one-ninth".
When their father died, the brothers were embarrassed to find that the property consisted of seventeen camels. However, a friend of their father helped them to solve the problem by lending them yet another camel, with the result that Ibrahim now owns nine healthy camels, Abdul is very proud of his six, and little Omar cannot decide which of his two he likes the better.
And the eighteenth camel?—it was returned to their father's friend. It had made the distribution possible, but yet remained quite unaffected itself—just as a catalyst will speed up a chemical reaction without being affected in any way itself.
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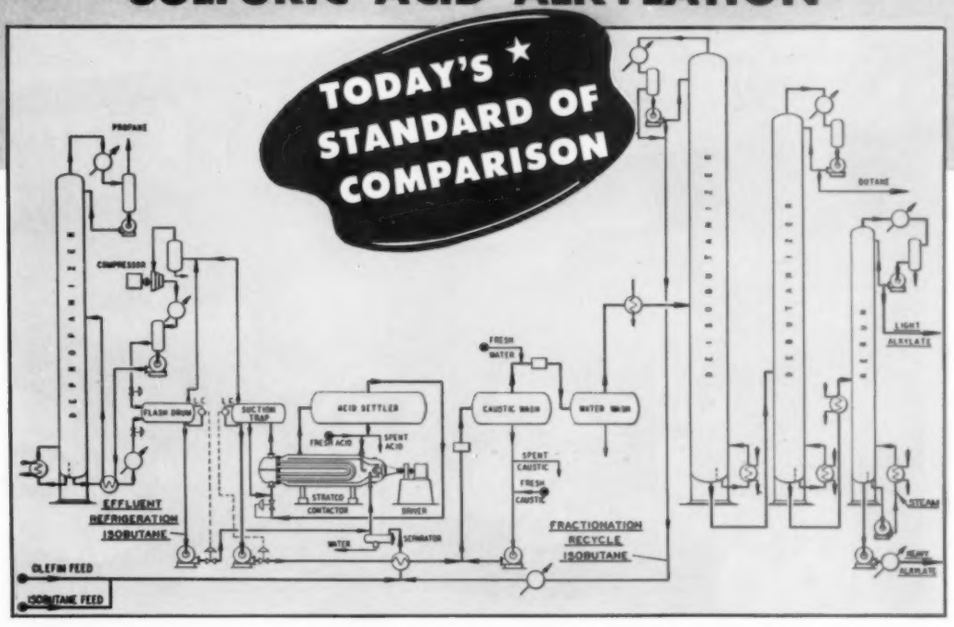

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July 1, 1952 .... July 1, 1957

Location	Approx. Design Cap. BPSD	Units
Texas City, Texas	7500	5 **
Watson, Calif.	3000	2 *
Amarillo, Texas	950	1
Eagle Point, N. J.	2100	2
Lawrenceville, Ill.	2100	2
Puerto Rico	1400	1
Houston, Texas	6300	4
Hattiesburg, Miss.	2650	2
Toledo, Ohio	1500	1
Beaumont, Texas	7900	5
Sugar Creek, Mo.	3900	2
Kent, England	2500	2
Trenton, Mich.	3600	2
Toledo, Ohio	1500	1
Atreco, Texas	2100	2
Anacortes, Wash.	2400	2
Anacortes, Wash.	2100	2
Formosa	900	1

*Closed cycle refrigerated revamp of a 5000 BPSD auto-refrigerated installation.

**Closed cycle refrigerated. All others Stratco effluent refrigerated.

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— Eugene Holman, Chairman of the Board, Standard Oil Company (New Jersey)

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DU PONT *Petroleum Chemicals* NEWS

Number 82 in a Series of Bulletins for the Petroleum Industry

DECEMBER 1957

Here's new proof of the solubilizing power of FOA-2

Du Pont Fuel Oil Additive No. 2 has long been known as an exceedingly effective fuel oil-stabilizer and sludge-dispersant and solubilizer. The first two qualities have been repeatedly demonstrated in field performance, and now the solubilizing power of the additive can be demonstrated also.

The demonstration is quite simple and can be made with no more equipment than a heat source (steam bath) and two small vials of fuel. The fuel is kerosine with a small amount of benzene containing dissolved sludge. FOA-2 is added to one of the fuel samples; then the benzene is boiled off of both samples. The time-lapse picture story (below) tells the story.

How FOA-2 solubilizes

The photos show that at the beginning sludge is soluble in the fuel, becoming insoluble

OVER

1 10:30 A.M., SEPTEMBER 23, 1957

2 10:42 A.M., SAME DAY

3 11:42 A.M., SAME DAY

4 1 P.M., SAME DAY

5 10:30 A.M., NEXT DAY

1. These bottles both contain 99% kerosine, 1% benzene and a small amount of sludge (15 mg/100ml) which is soluble in the fuel blend. To the bottle at right .01% of Du Pont FOA-2 has been added. This is the proportion recommended for protecting fuel oils (30 lb./1,000 bbl.).

2. The samples have been heated for 10 minutes in boiling water to evaporate the benzene. Sludge is already starting to appear in the bottle at left, not in bottle at right.

3. Note in cut 3 agglomeration of insoluble sludge particles at left, and clarity of FOA-2 protected oil at right.

4. Sludge formation has settled to bottom. Solution at right remains clear.

5. Most of the small sludge particles in left-hand bottle have now settled. After 24 hours, FOA-2 protected oil still shows no sign of sludge precipitation, and will continue clear almost indefinitely.

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

DUPONT *Petroleum Chemicals* NEWS

CONTINUED *Solubilizing Action*

only when the aromatic solvent portion (benzene) is removed. The right-hand bottle shows that FOA-2 keeps the sludge soluble, whereas it gradually precipitates in the bottle at left.

FOA-2 is a long-chain polymer with a critical balance between polar and oil-soluble groups. The polar groups are attracted to non-hydrocarbon constituents or residue particles, and the soluble groups maintain good oil-solubility of the combination.

FOA-2 *stabilizes* fuel by preventing interaction of non-hydrocarbon constituents or residue-formers in the fuel. It *solubilizes* some residues which are just slightly insoluble, and *disperses* other residue particles which are quite oil-insoluble.

Benefits of the additive

These three properties of Du Pont Fuel Oil Additive No. 2 keep oils free flowing . . . devoid of sludge which could cause clogging of heating systems.

They are responsible also for FOA-2's solution of the incompatibility problem. The sludge likely to precipitate when oils are mixed does not form if sufficient FOA-2 is present; 30 lb./1,000 bbl. is usually enough to solve incompatibility.

The third important function of the additive is its cleansing of systems already fouled with sludge. This saves the costs of downtime and of having systems cleaned manually.

New book about FOA-2

We recently published a comprehensive 28-page book about FOA-2. All

the basic information you will need is included—properties, composition, use concentrations, handling and addition methods, and performance testing data. Ask any of our representatives for a copy, or drop us a line.

You ought to know . . .

CARL W. FERRIS is manager of the Du Pont Petroleum Chemicals Division's Chicago district. This district serves the tetraethyl lead and other additives needs of refineries in Illinois, Indiana, Missouri, and parts of Michigan, Iowa, Kentucky, Tennessee and Wisconsin.

Mr. Ferris was previously an account manager in the Division's central region office which is headquartered also in Chicago. He joined the Du Pont Company in 1947 and his first assignment was at the Du Pont Petroleum Laboratory where he worked on fuel blending studies in the single cylinder engine laboratory. He then did road test work with the Du Pont fleet of fuel test cars. He was transferred to the Division's central region in 1951, where, before becoming an account manager, he was the regional automotive service representative and then sales promotion coordinator.

A graduate of Cornell University, Mr. Ferris has a B.S. degree in mechanical engineering. During World War II, he served for nearly 3 years in the U. S. Navy and held a Lieutenant, jg. commission. He is a member of the Society of Automotive Engineers.

How educators get practical industry experience at Du Pont

When a college professor tells a class of future chemists "how we used to do it at the plant," there's a good chance he's talking about the sound practical experience he picked up in industry.

The growing number of educators participating in Du Pont's summer employment program enjoy the opportunity of gaining experience and knowledge of industry which help them in their academic careers. They also supplement their incomes by summer work.

In helping educators in this direct way, Du Pont and many other industrial companies are contributing to a movement directed to the promotion of better industry-education understanding.

Du Pont broadened its summer program this year to include nearly 60 high school teachers and college professors. These men and women can draw on the experience they acquired at Du Pont plants or laboratories in 13 different states to help out with the vital job of training today's youngsters for tomorrow's jobs in industry and education.

The summer employment of college professors began just after World War II. Recently Du Pont employed high school teachers as well.

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OVER

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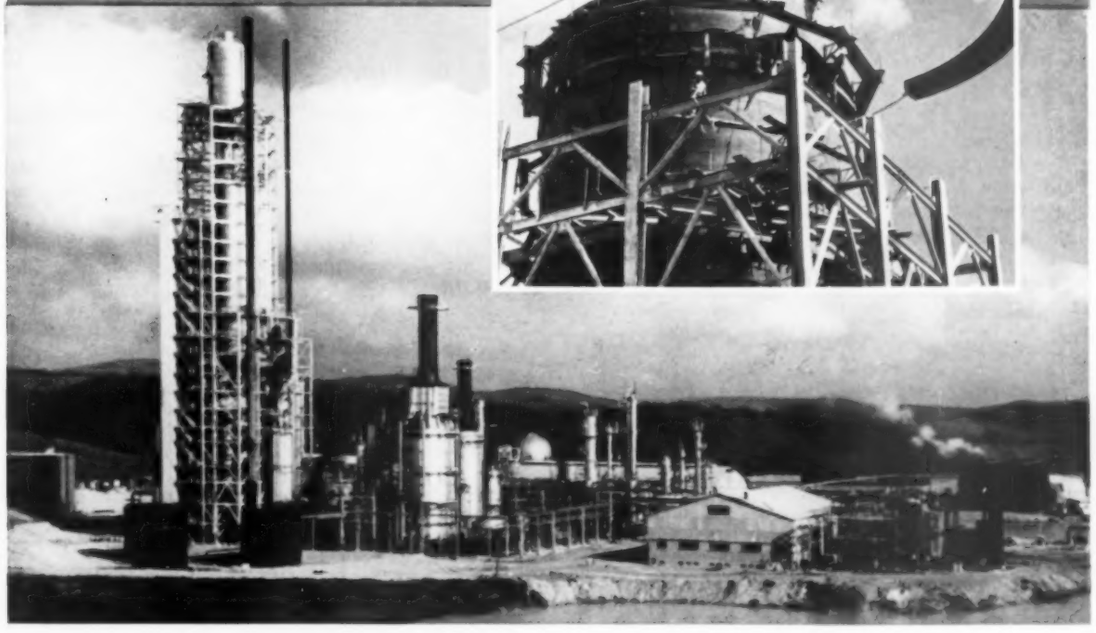
Brazilian Refinery gets LARGEST TCC UNIT

CB&I ERECTS FIRST TYPE 120 UNIT AT CAPUAVA REFINERY



Top: An air duct section for the TCC kiln being raised into place.

Bottom: General view of Capuava Refinery.

• At Capuava, north of Sao Paulo, Brazil, a main fractionating tower and the *first* type 120 Thermofor unit built was erected by CB&I in cooperation with their subsidiary, Sociedade Chibridge de Construcoes, Ltda. Both units were fabricated at our Greenville, Pa. plant and furnished through Hydrocarbon Research, Inc., New York, for Refinaria e Exploracao de Petroleo "UNIAO" S.A. The refinery has a crude capacity in excess of 20,000 bbls. per day.

• CB&I has *complete* facilities for designing, fabricating and erecting welded steel plate structures for the petroleum industry. Write our nearest office for details.

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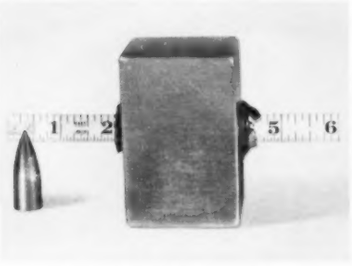

Illustration above shows a 2½" steel test sample pierced by an improved ½" Ogival Bullet fired by a McCullough M-3 Bullet Perforator.

McCullough Sectional Gun Gains Penetration Where Previous Attempt Failed

Depth of operation was only 1487'. 4½" O.D. casing had been cemented in 10¾" hole. Pay zone was bullet perforated by another service company but the formation would not break down. During the attempt to fracture, the pipe split above the zone and collapsed in the perforations.

Operator swaged out the 4½" casing, ran a 3" liner inside the 4½" and cemented the annulus. This operation made an impressive amount of steel and cement to be penetrated to gain production.

McCullough shot 20 improved ⅜" Ogival Bullets in the zone and the formation broke down at 800 lbs. Time on the job was one hour. Results: a good well and a satisfied oil man.

McCullough Sectional Guns are available in 1⅛" O.D., 1¾" O.D. and 2¼" O.D. sizes.

Powerful M-3 Guns Increase Production 316%

Hard Shooting M-3 Guns, Firing Improved Ogival Bullets, Gain 38 B/D Over Previous Jet Perforating

An excellent example of the penetrating power of McCullough M-3 Bullet Guns was recently reported from a California oilfield.

This was a shallow, low production field. The well had previously been perforated by another service company with shaped charges for a settled production of 12 barrels of oil per day.

Productive interval lay between 3837' and 3872' and was cased with special 7" O.D. 51 lb. casing. Casing was cemented in 9¾" hole through the pay zone.

Although skeptical of the ability of any bullet perforator to gain effective penetration through the extra heavy casing and thick cement sheath, the operator called for McCullough M-3 Bullet Guns.

McCullough Service Crew made three runs with 4¾" O.D., 20-shot M-3 Guns, firing 140 improved ½" Ogival Bullets, four per foot, in the 35' zone.

Production increased from 12 to a settled 50 barrels of oil per day—a gain of 38 barrels. The job required two hours, including rigging up and tearing down. To quote the operator, "Results were very satisfactory and gratifying".

"world's hardest shooting bullet perforator"

M-3 Penetrates Two Strings For a Good Well

Two strings of casing had been set through the pay zone at 5587'–5590'. 5" O.D. 18 lb. liner was cemented in 7⅝" O.D. 28 lb. casing which, in turn, was cemented in 11¼" open hole.

A 3½" O.D. McCullough M-3 Gun fired 18 improved ½" Ogival Bullets in the three foot pay zone. Operator stated he is satisfied it is his best completion to date.

Burr-Free Penetration

A new Burrless Bullet Cap, if desired, is inserted over the point of the improved Ogival Bullet at the time the M-3 Gun is loaded. It provides a completely burr-free hole on the inside surface of the perforated casing. Symmetrical, smooth holes make the use of ball sealers more effective in acidizing and sand fracturing—assuring more complete perforation shut-off.

Burr-free holes make casing scraping only a routine, precautionary measure and insure free passage of swabs, packers or other close fitting tools.

The jobs described above are certified to be true and accurate field reports of services rendered.

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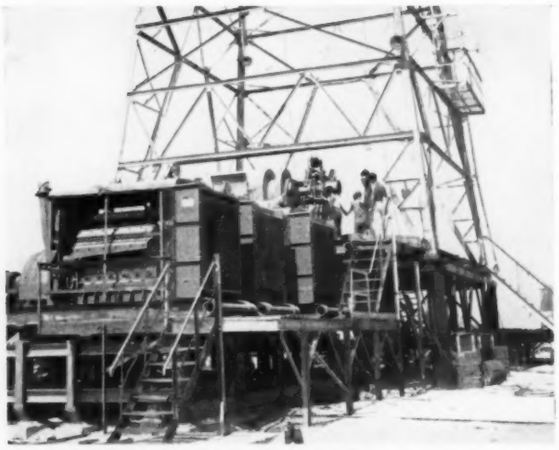
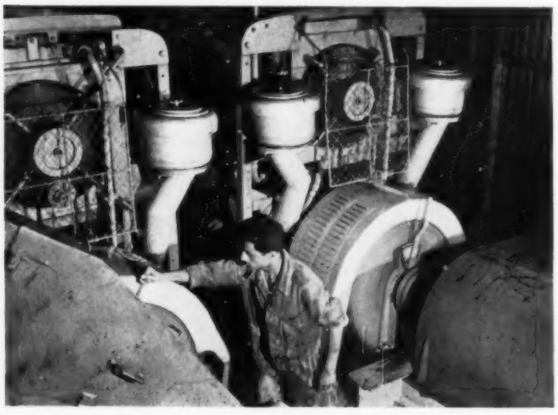
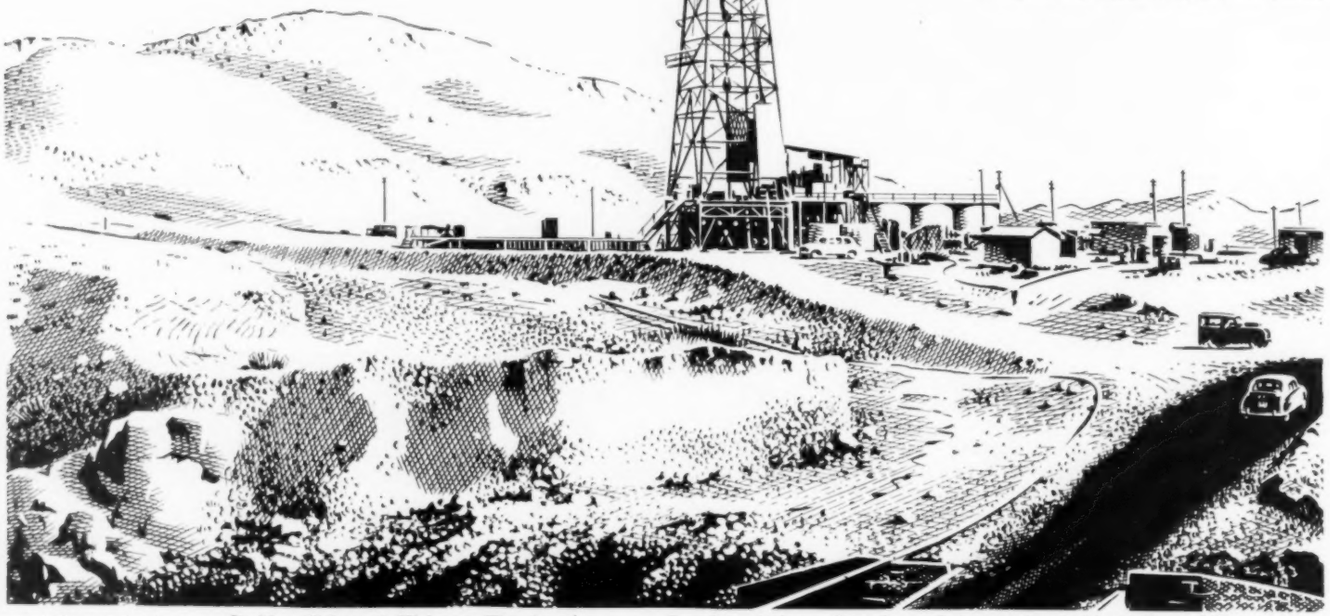


TRUCIAL COAST Shuweihat No. 1. rig with Paxman-engined draw works.
RUMAILA A machine minder at work on the Paxman-engined rig.
(B.P. photographs)



JAMBUR A general view of the drilling rig at Well No. 5 Jambur Field near Kirkuk.
(From a B.P. photograph)



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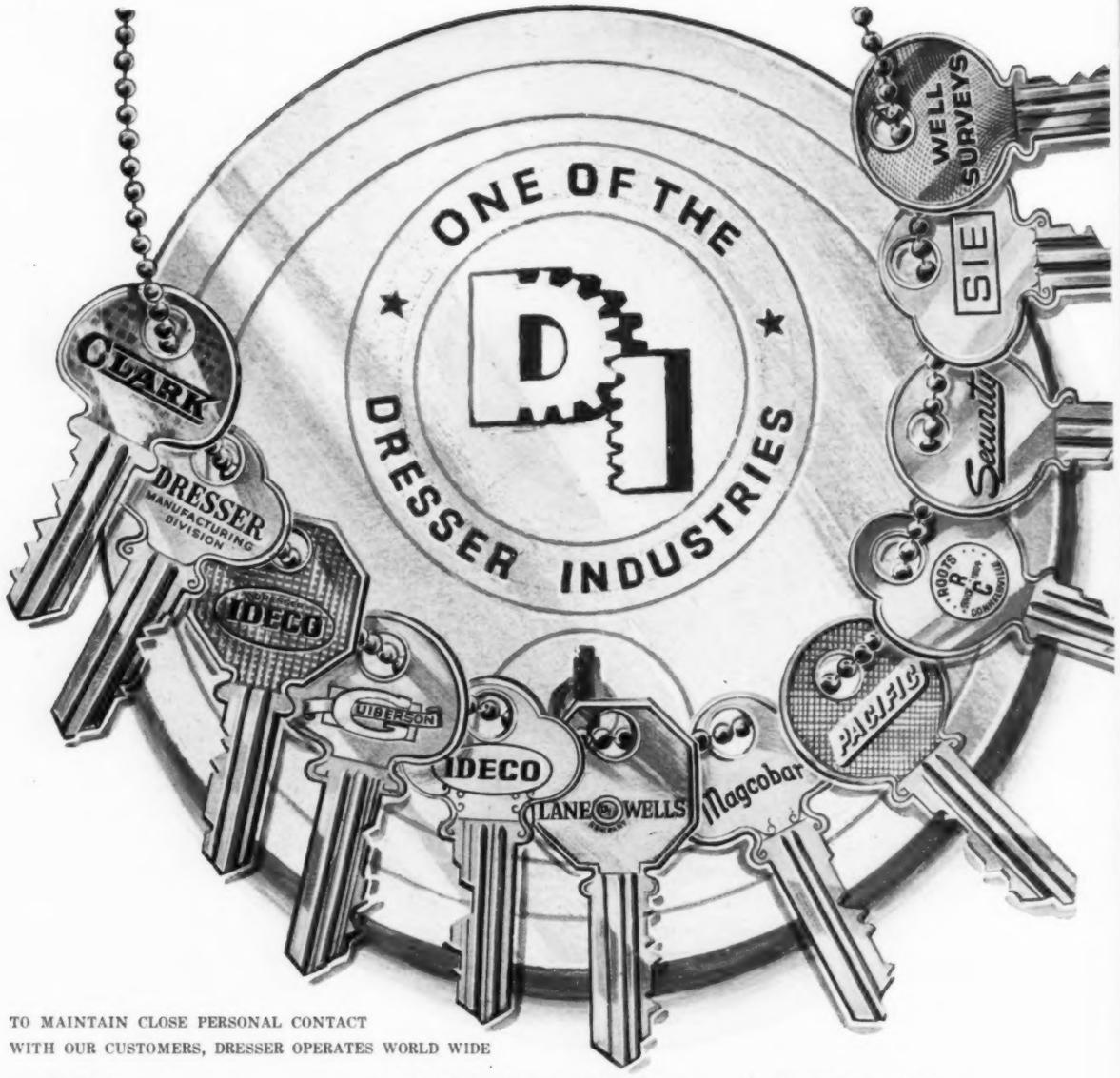

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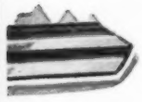

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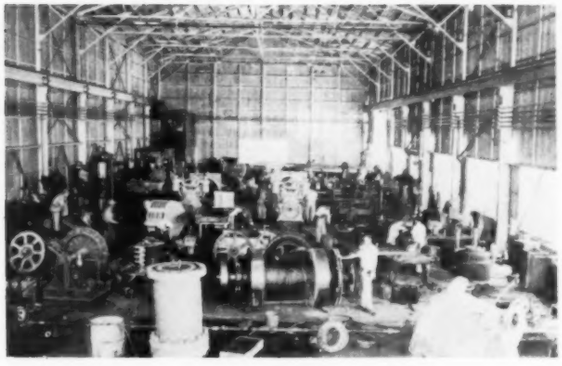

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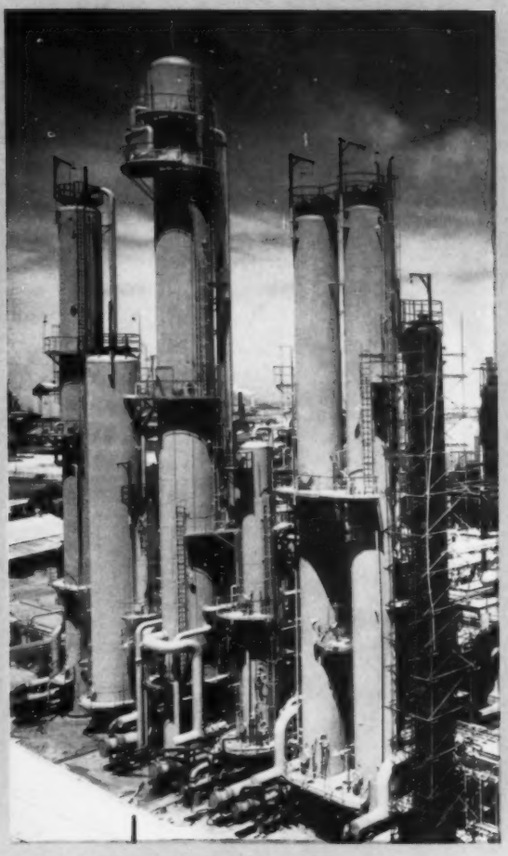
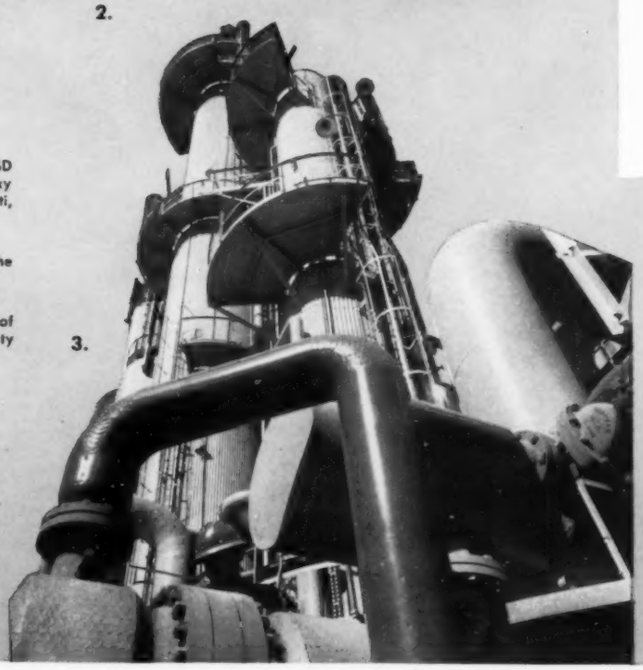


2.

1. The solvent extraction columns of the 5,000 B/SD Udex unit are dramatically framed against the sky at the Delhi-Taylor Oil Corporation's Corpus Christi, Texas, refinery.

2. Shown here is the Udex unit in operation at the Delhi-Taylor refinery, Corpus Christi, Texas.

3. Though highly functional the extraction towers of the 5,000 B/SD Udex unit add an element of beauty at the Delhi-Taylor refinery.



3.

Platforming—Udex Units Open New Petrochemical Market To Delhi-Taylor

By F. P. Sewell
Vice President
Delhi-Taylor Oil Corporation
Corpus Christi, Texas

F. P. Sewell

Customer confidence, plus our own confidence in the growth potential of petrochemicals prompted us recently to enter this field. Our investigation, some time before the spring of 1956, indicated a substantial market for benzene to be used in synthetic chemicals. We decided to build an installation for the production of aromatics. We needed a process that could smoothly fit into our operation, a process that could economically produce aromatics of highest purity. After carefully examining the available processes, we found that the Udex process efficiently and at low cost extracts benzene, toluene and xylenes simultaneously from a Platformate which we could produce in our existing Platforming unit. We were confident the Udex process was our answer.

The next step was a meeting with engineers of Universal Oil Products Company in the spring of 1956 to determine the design for the new Udex unit. With the design fitted to serve our requirements the only remaining problem was the time necessary to complete the unit. Accordingly, purchasing and preliminary expediting of the major components were left to UOP. This assured us of the fastest possible delivery of these items. We are indeed pleased that in just over a year, from design to on stream, we were able to keep our promise to our customers, supplying benzene exceeding nitration-grade specification. With successful aromatic production and a marketing program under way, we were also able to achieve our basic objective, "product diversification."

Increases Value of Products

A 5,000 B/SD Platformer, on stream since 1953, was designed originally with provisions to facilitate its change-over to the production of a Platformate best suited to aromatic extraction. Since 1953 this Platformer has been producing a Platformate used to up-grade the octane number of our pool gasoline. Thus, through converting our production to aromatics we were able to raise, substantially, the value of our products from this unit.

During the planning stages of the Udex unit with UOP we also launched into yet another phase of our expansion program. As a custom refiner we sell motor gasoline in quantity to several customers. We keenly feel a sense of responsibility to maintain the high octane level and quality of our pool gasoline consistent with the demands of today's high compression engines. To this end we made arrangements with UOP to install another Platformer, a 10,400 B/SD unit, and a 10,400 B/SD Unifining* unit. The Platformate produced in this unit, on stream in May, 1957, is used as a high octane blending component in our pool motor gasoline.

These units are also used to provide additional Udex feed stocks. This is done by charging a select feed to the Platformer-Unifiner in a blocked-out operation. The resulting Platformate is charged incrementally to the Udex unit. This Platformer is our third, and the second Platforming unit at the Corpus Christi refinery. The efficient operation and high quality of products from our first two Platformers influenced our decision to install this third Platformer.

Aromatic Production

Production of aromatics at the moment is approximately 2,000 B/SD. The growing benzene market includes application in the manufacture of phenol and styrene plastics, synthetic fibers, agricultural chemicals, detergents, pharmaceuticals and other chemicals. Toluene and xylenes are sold as chemical raw materials and solvents. Toluene finds some use also as a blending agent in aviation gasoline and as a "super-premium" gasoline blending stock.

Production of benzene, toluene and xylenes from UOP Platforming® and Udex® units provides Delhi-Taylor profitable product diversification

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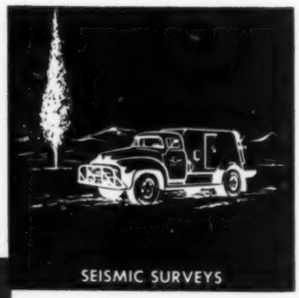
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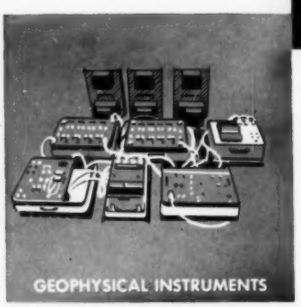
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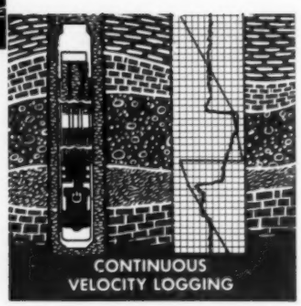
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Let's Look At Latin America

EVENTS of the past 18 months in the Middle East and the current political unrest in that part of the world make it appear that the oil industry is placing too much reliance for its supply on this area. It seems essential that other petroliferous areas should be developed as alternate sources of supply for "big" oil, and Latin America suggests itself as an ideal area for development when measured by any yardstick.

The industry has taken great satisfaction in the past in its ability to meet any international crisis without causing suffering on the part of its customers. Flexibility in sources of supply, in location and capacity of refineries, and in the transportation system has come in good stead both in time of war and in peace.

In the Iranian crisis, the world was suddenly deprived of a major source of crude and the world's largest refinery was shut down, but the industry quickly made up both losses and there was little or no inconvenience to the public. The Suez crisis was more severe, but rationing in Europe was more a matter of prudence than necessity.

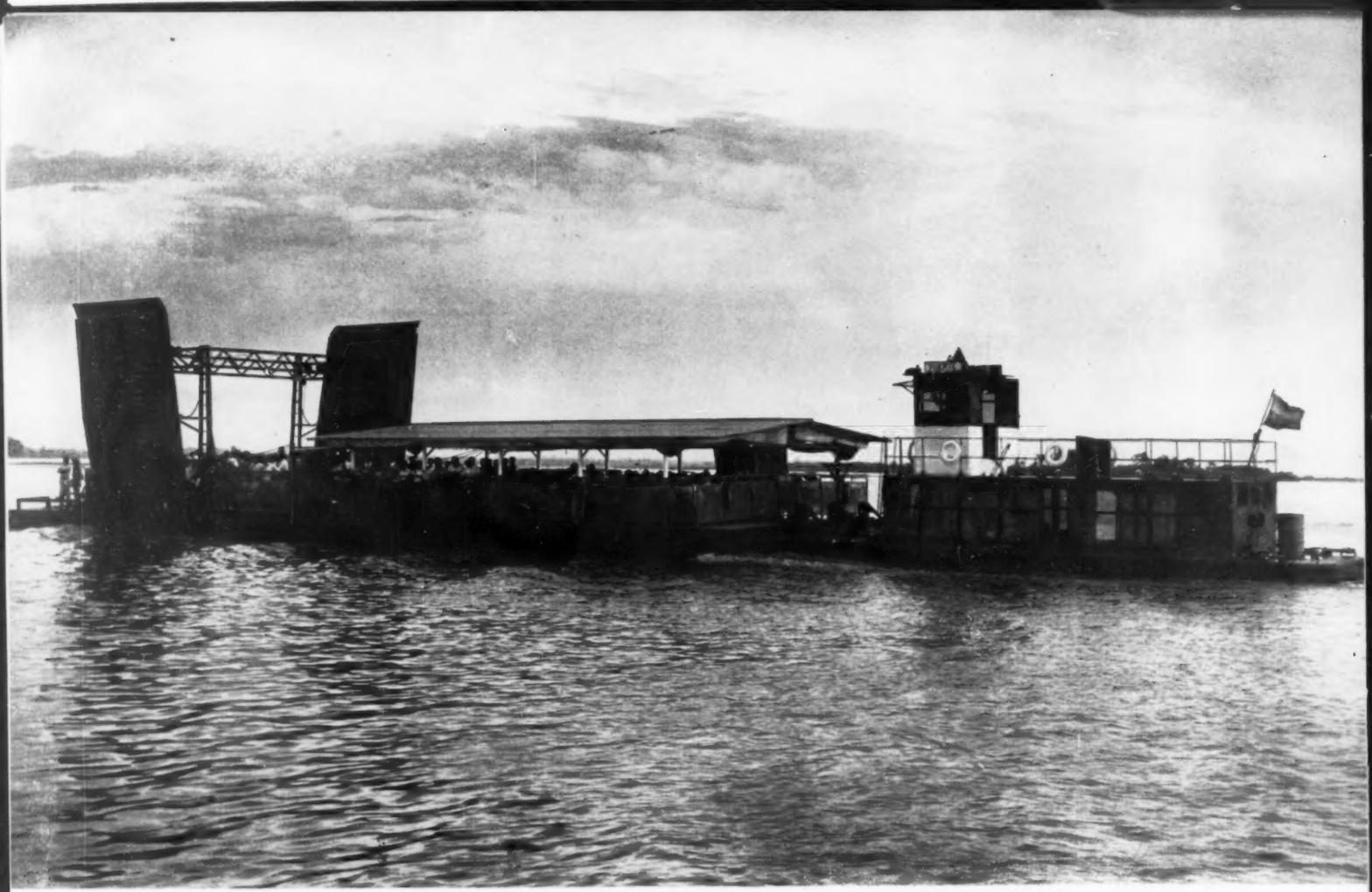
Latin America has vast potential oil resources and is worthy of intensified geological and geophysical reconnaissance. The economic climate is generally favorable, and most countries welcome foreign capital for the development of their natural resources on a fair basis. In this issue are presented a series of articles discussing current developments in many parts of Latin America. The editors of *World Petroleum* have supplemented these reports with a check list in which an effort has been made to rate the 29 most important oil countries and possible oil-producing countries in the order of their relative desirability as areas in which to make an investment of time and money.

In developing this tabulation, the editors have considered under geology known surface and other indications of the presence of oil, the volume and age of sedimentary deposits, plus the amount of reconnaissance already undertaken and the results of drilling to date. Under "legal," consideration has been given to corporate requirements imposed by the various governments, subsoil ownership, petroleum legislation, and taxation. Under the "economic" heading are considered labor conditions, development costs, local domestic demand, possible or existing export transportation facilities, development costs, refining facilities in place, and the present size and stability of government revenues.

The tabulation is, of course, not absolute, but is presented by the editors as their best estimate based on a considerable study. Countries are listed in descending order of relative attractiveness to the foreign investor.

RELATIVE FAVORABILITY OF LATIN AMERICAN COUNTRIES

GEOLOGIC	LEGAL	ECONOMIC
Venezuela	Venezuela	Venezuela
Mexico	Cuba	Colombia
Argentina	Ecuador	Peru
Peru	Colombia	Ecuador
Colombia	Peru	Cuba
Brazil	Guatemala	Brazil
Bolivia	Bolivia	Costa Rica
British W. Indies	British W. Indies	Panama
Ecuador	British Honduras	Puerto Rico
Chile	Panama	Dominican Republic
Guatemala	Costa Rica	Chile
Cuba	Nicaragua	Nicaragua
Costa Rica	Honduras	Argentina
Panama	Puerto Rico	British Honduras
Nicaragua	Virgin Islands	Haiti
British Honduras	El Salvador	Mexico
Paraguay	Uruguay	Guatemala
Uruguay	Paraguay	Paraguay
Honduras	British Guiana	Uruguay
El Salvador	Netherlands W. I.	El Salvador
Puerto Rico	Surinam	Bolivia
Haiti	Haiti	Honduras
Dominican Republic	Mexico	British W. Indies
Neth. W. Indies	Dominican Republic	Virgin Islands
Virgin Islands	French W. Indies	Neth. W. Indies
French W. Indies	French Guiana	Surinam
British Guiana	Argentina	British Guiana
Surinam	Brazil	French Guiana
French Guiana	Chile	French W. Indies



Shell's ferry crossing the Magdalena River between the Casabe field and Barrancabermeja, which is used to carry personnel and supplies (photo, courtesy Shell Colombia).

Oil hits peak in Colombia

Drilling and exploration are at an all-time high in Colombia, stimulated by new legislation and exchange benefits. Several important deep tests are drilling in an effort to offset Colombia's declining older field.

by **E. Ospina-Racines**
Bogota, Colombia

EVERY 10 years oil exploration and development activities reach a maximum in Colombia. Today's experience is comparable to the oil activity witnessed back in 1947 and 1937, as shown by the 30 total prospective and active rigs in Table 1. Soon there will be four additional rigs exploring for oil, added to the 11 now drilling—bringing the total to 15 wildcat rigs. This is just about half the number of wildcat rigs operating in Venezuela, and speaks well for the interest the oil operators are taking in Colombia's prospective oil land. There are 12 operators listed; in addition to these, active oil firms, operators, pipeline, marketers, contractors, and service firms total 41 engaged in the oil business in the country. All this activity foretells an important immediate future for Columbian oil.

Colombia's oil output is currently 123,952 b/d of crude. Shell contributes 33.2% of the total, with 42,211 b/d. The other three producers are the official oil enterprise Ecopetrol, Texas, and Colpet. Production data by properties and operators appear in Table 2. It is noted that the total output has increased only to 127,053 b/d from 125,472 b/d during the past 13 months. Oil output of the principal fields is declining. The only properties which show an increase are: Cicuco, San Pablo, Palagua of Colpet, Shell, and Texas. The wildcatting now in progress promises to increase output, however, and compensate for the decline. Colombia's oil production is obtained from 22 fields, and their individual importance in producing oil is noted in Table 4.

Current drilling is reported in Table 3. Current and prospective drilling and locations in the country are shown in the accompanying map. It reveals a widespread oil activity not seen in Colombia in a decade or two. Table 5 lists the drilling contractors and rigs available now.

Referring to the map at No. 5, Mecom will be drilling on Colombia's Caribbean coast, with An-Son as contractor. Ecopetrol has three concessions at this location, and will contribute 25% and Mecom 75% of the exploratory cost for an equal interest. Ecopetrol receives a 5% overriding royalty as concessionaire. The blocks have been contracted under the terms of the oil law and pay in royalty alone 13% to the government. The entire Caribbean coast of Colombia is strewn with oil seeps, and an important one was discovered at this point a few years back while drilling for water at Tolu.

At No. 7, and as part of the play which is being carried out on Colombia's Caribbean coast, is the Mobil-Intercol Cordoba 1 wildcat, spudded August 30 last with a 15,000-ft rig—with Drilexco as contractor.

TABLE 1 Summary of Current Drilling & Production in Colombia by Operators—October 1957

Operator:	Ecopetrol	Texas	Colpet	Shell	Inter-col	Rich-mond	Mo-bil	Col-citco	Bene-dum	Me-com	Sun	Delta	Total Colombia
Prospective wildcat rigs:									1	1	1	1	= 4 rigs
Wildcats drilling:	0	3	2	1	2	1	1	1	0	0	0	0	= 11 wildcats
Field rigs drilling:	2	4	7	2	0	0	0	0	0	0	0	0	= 15 field rigs
Weekly footage:	546	5,831	2,660	1,833	715	9	0	1,044	—	—	—	—	= 12,638 ft
August Oil Output—b/d													
Crude—b/d	27,885	28,240	25,380	42,211	236								= 123,952b/d
+Cond.—b/d	1,985		877										= 126,814b/d
+LPG—b/d	190		49										= 127,053b/d
Percentage—%	23.7%	22.2%	20.7%	33.2%	0.2								= 100.0%

TABLE 2 Crude + Condensate + LPG Production of Colombia Past 13 Months—By Operators

Month	Ecopetrol Crude	Cond.	Colpet Barco	Colpet Cicuco	Shell Yondo	Canta-gallo	Shell S. Pablo	Shell Dif-cil	Texas Velas-quez	Texas Pala-gua	Texas Tetuan	Intercol Aqa. +Tot.	Total Colombia b/d
1956													
Aug.	29,384	1,839	26,685		33,099	2,497	4,489	1,401	24,559		1,212	309	= 125,472
Sept.	29,353	2,165	26,932		32,295	2,463	4,425	1,379	25,422		1,237	339	= 126,010
Oct.	29,256	2,143	27,046		32,199	2,440	4,018	1,378	24,838		1,168	413	= 124,899
Nov.	29,232	2,139	27,142		31,101	2,532	3,799	1,433	25,122	811	1,246	426	= 125,074
Dec.	29,471	2,093	26,470		30,829	2,603	4,447	1,435	25,244	2,222	1,304	422	= 126,810
1957													
Jan.	29,296	2,344	26,109	110	30,745	2,665	4,473	1,367	24,405	3,292	964	423	= 126,195
Feb.	29,135	2,135	26,617	258	30,840	2,634	4,258	1,293	22,296	4,230	1,251	414	= 125,991
Mar.	29,046	2,095	26,447	301	31,419	2,590	3,937	1,297	22,655	4,758	1,249	395	= 126,189
April	28,990	2,064	26,006	488	31,550	2,570	4,430	1,339	21,976	4,851	1,239	375	= 125,873
May	28,899	2,229	25,953	612	31,292	2,608	5,796	1,307	22,664	4,730	1,142	351	= 127,583
June	28,743	2,252	25,081	699	30,701	2,563	8,374	1,275	22,126	5,267	1,277	317	= 129,575
July	28,734	2,257	25,311	631	30,242	2,629	8,635	1,299	21,320	5,579	1,257	194*233	= 128,321
Aug.	27,885	2,175	25,573	733	30,093	2,594	8,268	1,256	21,430	5,583	1,016	211*236	= 127,053

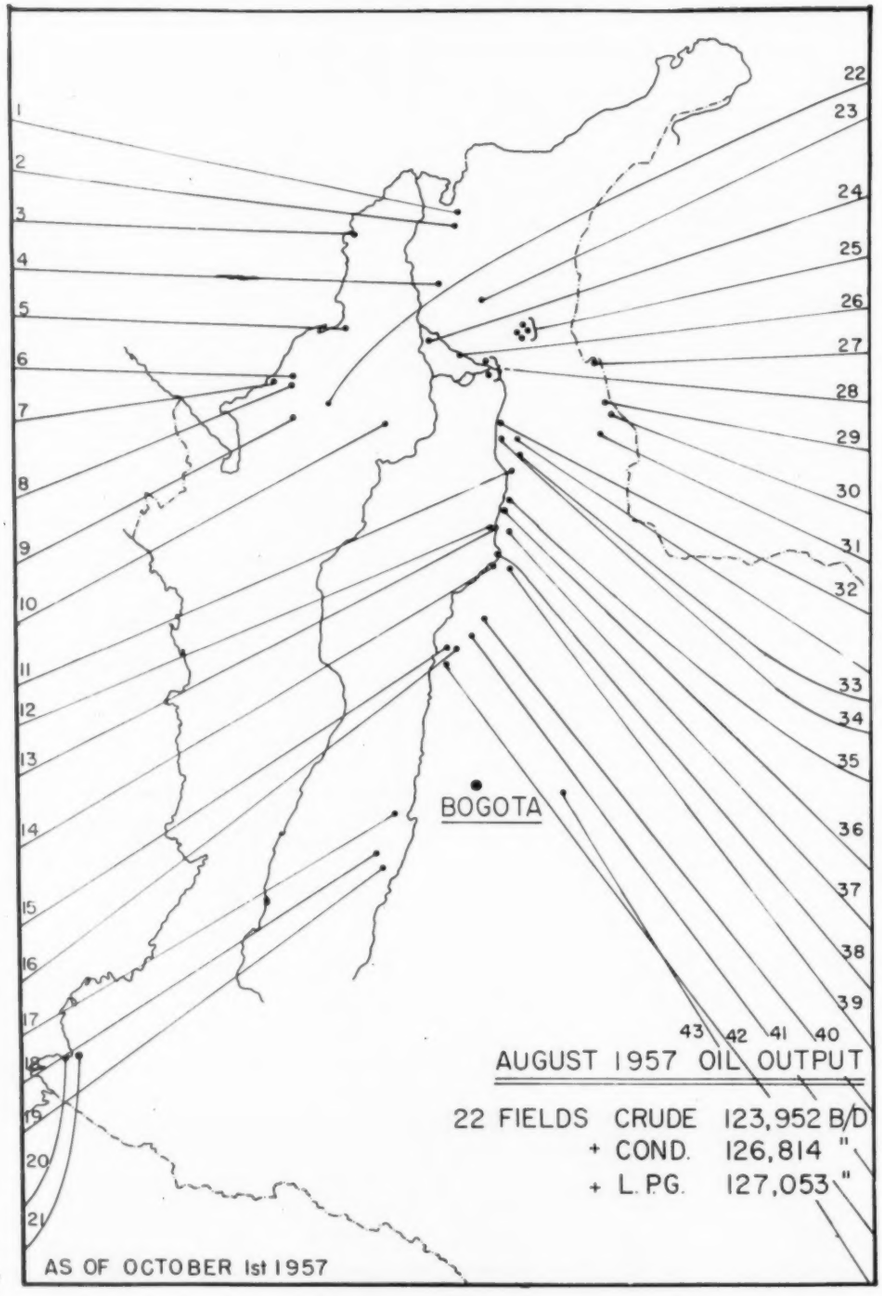
*Texas Ermitaño production. Ermitaño block placed in commercial production as of July 1, 1957. Of the 127,053 b/d of production, 123,952 b/d is crude only; 2,862 b/d is condensate; 239 b/d is LPG.

The surface formation is Oligocene; and, according to qualified geologists, the total thickness of the sedimentary cover in the Sinu basin may reach 20,000 ft. The only deep test so far was carried down to 10,000 ft at No. 9, the Floresanto block, by Socony-Mobil some 10 years ago. An independent Houston-New Orleans group took over this block, and drilled two shallow wells as indicated. Socony discovered the Floresanto, a noncommercial pool here.

At No. 8, Sun-Pure-United Carbon will

Reception by Max Crawford in honor of J. O. Bower (left to right): USA Ambassador John Moors Cabot; J. O. Bower, executive vice president, Colombian Petroleum Co., operator of Barco concession; Max Crawford, general manager, Colpet Barco, operations; William Magner and Virgilio Barco. The latter is grandson of his namesake and original concessionaire of the Barco concession, granted General Barco in 1905 and placed in commercial production in 1939; owned 50-50 by Mobil Texas.

PRODUCING FIELDS AND DRILLING IN COLOMBIA



LEGEND

1 NEW ORLEANS INDEPENDENT BLOCK 443

2 No. 772 INDEPENDENT BLOCK

3 SUN FARMOUT—2 BLOCKS FROM INTERCOL

4 No. 773 INDEPENDENT BLOCK

5 JOHN W. MECOM PROSPECTIVE WILDCAT

6 E. OSPINA—RACINES BLOCK—169 35,816H. = 88,466 ACRES

LEGEND

7 MOBIL-INTERCOL CORDOBA WILDCAT SPUDDED AUG. 30—NOW DRILLING DRILEXCO OIL WELL 96 RIG

8 SUN PROSPECTIVE WILDCAT LOCATION ON MOBIL-INTERCOL FARMOUT—TO SPUD BY MARCH 1958

9 DELTA COLOMBIAN OIL—HOUSTON N. ORLEANS INDEPENDENT—DRILLED TWO WILDCATS 1669 ft.—2700 ft.

LEGEND

10 RICHMOND CECILIA 4831 ft. STRAT TEST REACHED BASEMENT

11 AN—SON LEBRIJA FARMOUT DRILLING 250 B/D LEBRIJA I MOBIL DISCOVERY

12 SHELL CANTAGALLO 2600 B/D FIELD

13 SHELL YARIGÜI 8600 B/D FIELD IN RIVER BED

14 CITIES SERVICE 75% ECOPETROL 25% CHUCURI I WILDCAT DRILLING BELOW 6,700f NATIONAL 130 RIG

15 TEXAS PALAGUA 5,600 B/D. FIELD

16 TEXAS ERMITAÑO 200 B/D. FIELD

17 INTERCOL GUALANDAY 3 DISCOVERY 850 B/D. 38° A.P.I.-T.D. 7,992 ft. JULY 1956

18 TEXAS 1200 B/D FIELD—TETUAN ORTEGA

19 INTERCOL ANDRADE 1 WILDCAT DEEP TEST NATIONAL 130 RIG OCT. 1 DRILLING BELOW 5,200 ft.

20 E. PAULEY CONCESSION TUMACO BAY

21 MOBIL CHAGÜI WILDCAT 13,107 ft. D & A COMPLETED 1956

22 INTERCOL JOBO GAS POOL—DRILLING

23 SHELL DIFICIL 1300 B/D FIELD

24 COLPET CICUCO DISCOVERY—BASAMENT AT 8115 ft. PRODUCING 750 B/D—43° A.P.I. FROM 3 WELLS—DRILLING

25 No. 926—927—928—929—128,000h INDEPENDENT BLOCKS

26 RICHMOND PROSPECTIVE WILDCAT

27 COLPET RIO DE ORO 3,250 B/D FIELD

28 No. 751—752 INDEPENDENT BLOCKS

29 COLPET TIBU 19,000 B/D FIELD

30 COLPET SARDINATA 1,600 B/D FIELD

31 COLPET ESPERANZA 1—7,652 WILDCAT D & A. No. 2—3,155 DRILLING

32 COLUMBUS-REXALL OIL CO BLOCK 628 ATLANTIC VENTURES LTD.

33 INTERCOL BUTURAMA 90 B/D FIELD TOTUMAL 150 B/D "

34 BENEDUM—TREES PROSPECTIVE WILDCAT

35 INTERCOL MATA NON-COMMERCIAL DISCOVERY 9663 ft.

36 SHELL LAS GARZAS 10,012 ft. WILDCAT TESTING

37 TEXAS SOGAMOSO DISCOVERY 1—12,038 2—12,657 3—SPUDDED AUG. 8

38 SHELL CASABE 30,000 B/D FIELD

39 ECOPETROL 28,000 B/D. FIELD SUPPLIES BARRANCA REFINERY

40 GUAYABITO PRIVATE OIL LANDS 15,000 ft.

41 TEXAS CORCOVADO I WILDCAT DR'LNG. BELOW 5,000 ft.

42 TEXAS 22,000 B/D VELAZQUEZ FEE PROPERTY

43 TEXAS WILDCAT 1958 GUAVIO BLOCK

TABLE 3 Oil Drilling and Production in Colombia (Week Ending Sept. 22 1957)

OPERATOR	Structure or Property	Well No.	Depth (Feet)	Weekly Footage	Status of Operations	Rigs Active	Explor-atory	Field	Service
1. ECOPETROL	Colorado	36	6,048	0	F.D. On production test, swabing				
		30	4,447	546	Drilling and coring		0	2	4
2. TEXAS	Matadero	2	8,876	243	Drilling—9⅝ in. at 598 ft				
	Palaquo	41	816	816	Spudded Sept. 20				
		45	3,921	483	Ran Schlumberger-perft'd.; testing				
		55	4,302	0	Temporarily suspended				
		62	1,123	713	Drilling				
		67	1,776	1,092	Drilling				
	Ermitaño	2	6,278	0	Waiting on completion				
	Caipal	2	5,635	0	Pumping				
	Corcovado	1	5,825	841	Drilling; 10¾ in. at 1,289 ft				
	Sogamoso	2	12,657	0	Making 60 b/d on test				
		3	7,609	1,643	Drilling				
				5,831 ft	Weekly footage	Rigs:	3	4	5
3. COLPET	Esperanza	2	3,155	0	Operations suspended				
	Cicuco	3	8,418	0	Testing				
		4	8,207	145	Drilling				
		5	8,275	0	Testing				
		6	8,496	0	PB 8318 Testing				
	Tibu	307	5,160	0	PB 4550—Completed 90 b/d 30 API				
		310	4,855	1,295	Drilling				
	Sardinata	29K	7,354	468	Drilling				
	R. de Oro	39K	7,832	112	Drilling				
		40K	1,658	0	Reaming				
		47	1,900	0	FD pumping 59 b/d 39.6 API				
		48	1,910	640	Logging				
				2,660 ft	Weekly footage	Rigs:	2	7	4
4. SHELL	Casabe	440	5,560	1,372	Completing				
		441	461	461	Drilling spudded Sept. 22				
	Yarigui	12	8,007	0	Completing—producer				
	Las Garzas	1	10,012	0	Testing—reported good discovery				
				1,833 ft	Weekly footage	Rigs:	1	2	4
5. INTERCOL	Andrade	1	5,490	353	Drilling—National 130 rig				
	S-4		4,434	362	Drilling				
				715 ft	Weekly footage	Rigs:	2	0	0
6. RICHMOND	Cecilia	1	4,831	9	D & A strat test				
	Ayapel	1			Rigging up strat test		1	0	0
7. MOBILE	Cordoba	1	1,786	0	Preparing to drill ahead				
8. COLCITOO	Chucuri	1	6,405	1,044	Drilling	Total	9	15	17

wildcatting at No. 31 at Esperanza, a most difficult location.

Going upstream along the Magdelena River at No. 36, Shell is reported to have brought in Las Garzas wildcat on test for some few hundred barrels daily, having drilled it to 10,012 ft. Just north of this location, Intercol completed at No. 35 its Mata 1, having drilled it to 9,663 ft, as a noncommercial producer. Shell's Las Garzas discovery may spur Intercol to further drilling. The latter wildcat is in the same block at Shell's Yaragui field, at No. 13 on the map, which was producing as of August 8,268 b/d, where No. 12 well is now being completed—which will add considerably to the production. This field, located in the river bed, has had wells producing as much as 4,000 b/d, and development drilling is in progress from an island, with directional drilling.

At No. 37 Texas drilled two wildcats, Sogamoso No. 1 and 2, to 12,038 ft and 12,657 ft, respectively, and No. 3 is drilling. No. 2 is rated at 60 b/d, and No. 1 was also a small producer. This concession was taken over from Shell which, in turn, took it over from Mobil after considerable drilling. The latter two operators have each a 2% overriding royalty. At No. 41, Texas is drilling its Corcovado No. 1 wildcat, and already has promising shows. Some 20 years ago

(Continued on page 66)

be drilling early in 1958 in farmout acreage, having acquired a 50% interest in eight blocks covering some 750,000 acres for two wells, or some 18,000 ft. Apparently Mobil-Intercol anticipate oil production at around the 9,000-ft level in view of the terms of the deal. Heretofore all the drilling on Colombia's Caribbean coast has been shallow, except for a few tests near Barranquilla.

The first location for Sun is expected in a block just south of and adjacent to the No. 169 recently negotiated with Colombian Sun Oil Co. E. Ospina-Racines bought the oil rights to the concession application and concluded a deal to transfer these to Colombian Sun. Block No. 169 was originally solicited in concession in 1943 by Colombian individuals and, a month following the filing, Socony-Mobil filed bid No. 180 which covered No. 169 in part. In view of the overlapping, litigation ensued between the parties; and the matter was eventually taken to the Council of State, Colombia's highest administrative law court, which ruled against the Socony-Mobil bid which overlapped, and the ministry then proceeded to accept and grant priority to bid No. 169 which, in turn, reduced the Mobil bid No. 180 to 15,000 hectares. The rights to bid No. 169 at one time or other have been negotiated with Stanolind, Tri-Pet—which, however, pulled out of the country, and the transfer was not concluded. In July of 1957 these were bought by the author and negotiated with Colombian Sun.

Complementary to this drilling will be a wildcat which Sun is committed to drill at No. 3 near Cartagena for a 50% interest in a farmout from Intercol. The coming year will be particularly eventful for Colombia's Caribbean coast—where, incidentally, the earliest oil drilling took place in 1907, just 50 years ago, at Tubara, near Barranquilla, by a British enterprise.

Further inland on Colombia's Caribbean coast at No. 24, Colombian Petroleum Co. made its Cicuco discovery last year—No. 1 reaching basement at 8,115 ft; and, at this writing, the sixth well drilled, which is No. 4, has tested as much as 1,500 b/d and is reported good for 4,000 b/d. As of January 1957, the field was placed on production for test, yielding 110 b/d; and by August, with additional wells, it was making 733 b/d—so that the latest completion, No. 4 well, practically triples the oil output of this discovery of 43 API oil. This concession is held by Colombian Petroleum Co., owned by Mobil-Texas 50-50. Colpet is developing the fields in the Barco concession, shown as No. 27, 29, 30, and is

TABLE 4 Colombia—Oil Production By Fields & Operators (July 1957)

Operator	Field	Barrels Daily
Ecopetrol	1. Infantas	8,038
	2. La Cira	17,262
	3. Colorado	592
	4. Galan	2,842
	Condensates	2,057
	LPG	200
Texas	5. Velasquez	21,320
	6. Palaguo	5,579
	7. Ortega	1,161
	8. Tetuan	96
	9. Ermitaña	194
Intercol	10. Buturama	83
	11. Totumal	150
Shell	12. Casabe	30,242
	13. S. Pablo	8,635
	14. Dificil	1,299
	15. C Gallo	2,629
Colpet	16. Tibu-T	15,010
	17. Tibu-C	4,097
	18. Petrolea	243
	19. Carbonera	82
	20. Cicuco	631
	21. R. de Oro	3,259
	22. Sardinata	592
	Sardinata	1,158
	Condensates	835
	LPG	35

TABLE 5 Active Drilling Contractors & Rigs in Colombia—October 1957

Contractor	Rigs	Type	Operator or Client	4½-In. Drill Pipe Rating	Representative in Colombia
1. Loffland Bros.	1	Emsco J 1250	Texas	15,000 ft.	C. Richardson
	1	National 100	Colpet	12,000 ft.	
	1	Unit U 20	Sun	12,000 ft.	
2. An-Son	1	Idecho H 40	Richmond	6,500 ft.	C. L. Pitts
	1	Cardwell 0	Mecom	9,000 ft.	
	1	Cardwell J 450	Texas	6,500 ft.	
3. Santa Fe	1	National 55	Texas	8,000 ft.	S. Collester
4. Drilexco	1	Oilwell 96	Mobil	15,000 ft.	R. H. Deem
TOTAL RIGS	8				

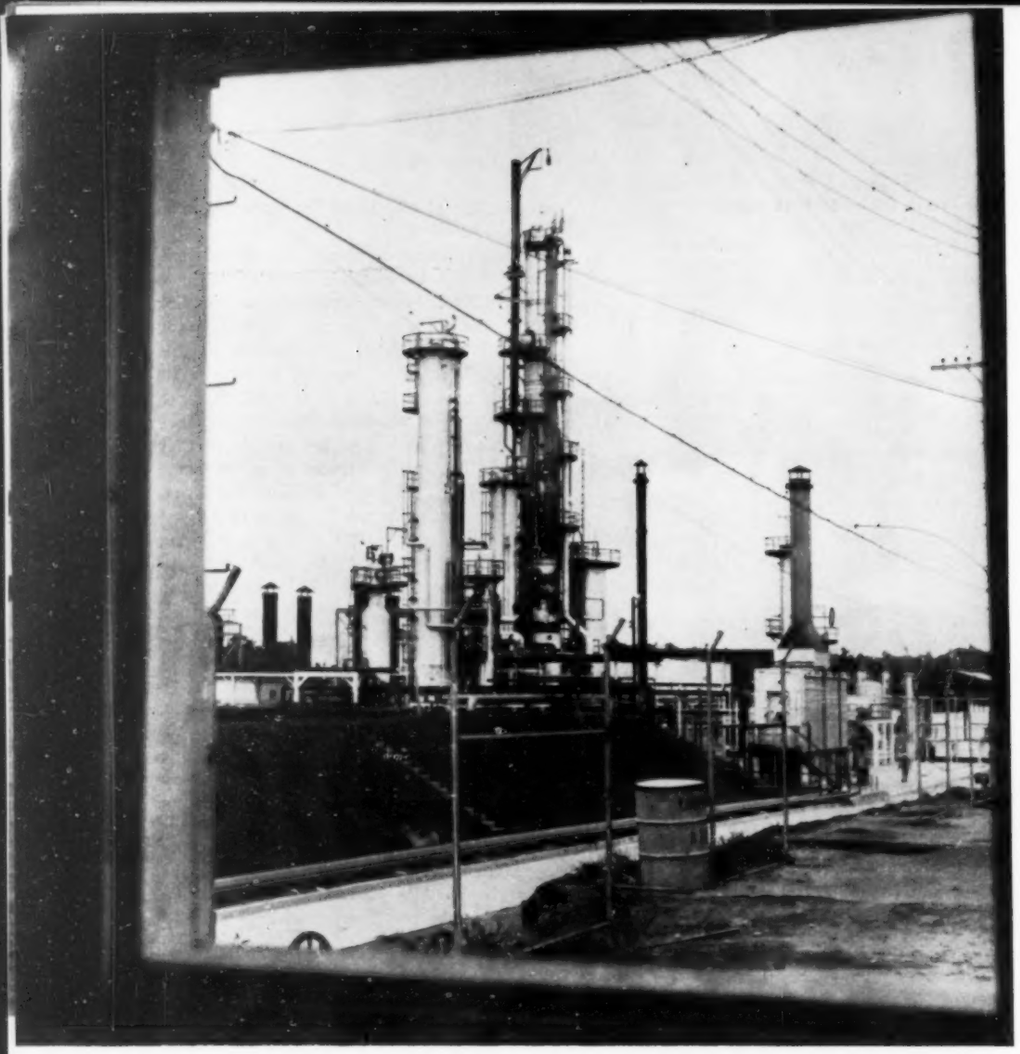


Fig. 3 View of processing area from the office window showing the 5,000 b/d atmospheric and vacuum distillation unit at left and 2,000 b/d UOP fluid catalytic cracking unit at right.

First refinery in the upper Amazon valley

by H. Weiser

Dr. Herman Weiser received his chemical engineering degree and Ph.D. from the German Technical University, in Prague. A third-generation oil man, he has spent 25 years in all phases of the industry, ranging from design and operation of refineries through sales and technical service in many different countries.

Dr. Weiser served with various international oil companies prior to joining Southwestern Engineering Co., in 1954. Since his association with SWECO, he has devoted the major portion of his time to refinery sales, engineering, and operations for the company's Engineering and Construction Division. He was in charge of startup operations of the COPAM refinery at Manaus.

ONE of the world's most interesting oil refineries has just been brought onstream by Companhia de Petroleo da Amazonia (COPAM) at Manaus in the Brazilian state of Amazonas (Fig. 2). Since Manaus lies in the heart of the vast underdeveloped Amazon valley, 1,000 miles inland from the coastal port of Belem, this new 5,000 b/d refinery represents a remarkable combination of triumphs over problems of logistics, economics, and weather, as well as a significant technical accomplishment for its builders.

Brazil has seven other oil refineries. These are located in the southern and southeastern regions of the country where Brazilian industry has concentrated. The new refinery is the first to be constructed to the north. This enterprise represents a notable departure from conventional industrial development sequences in which a plant is built to satisfy the demands of a market. This new refinery represents a reversal of such thinking, in that it is the first step in the development of its own markets as the initial enterprise in the industrial development of the upper Amazon basin. COPAM, as envisioned by its owners, is to be the nucleus of a vast complex of industry to exploit the enormous raw-material potentials of the region.

The idea of introducing the oil industry into the Amazon valley was conceived by two outstanding Brazilian industrial leaders, Isaac Benayon Sabba and Artur Soares Amorim, president and executive vice president, respectively, of Companhia de Petroleo da Amazonia. Mr. Sabba's group of Brazilian industrialists recognized the necessity and advantages of an oil refinery in the Amazon valley for the development of other industries which are planned in this area.

The fantastic natural resources of the Amazon valley, as one of the world's most important underdeveloped areas, are recognized by economists and industrialists all over the world. However, the practical development of such an area calls for men of high ideals, vision, and pioneering spirit. Such qualities are essential to face the many risks in the task of developing indus-

Fig. 1 Outline map showing location of Manaus refinery site with reference to crude sources and markets as well as major industrial centers of Brazil.

Fig. 4 The refinery was officially inaugurated, January 3, 1957, when President Kubitschek cut the ribbon. Isaac Sabba, COPAM's president, is shown at President Kubitschek's right and Dr. Artur Amorim, COPAM's executive vice president, is at his left.

tries in as remote a part of the world as the Amazon valley, and to master the formidable difficulties which accompany ventures of this nature.

In addition to an important export business in indigenous products, Mr. Sabba's group is already active in certain industries such as wood and rubber. They are now planning the construction of a cement plant and the development of a road program. At some future time, Mr. Sabba contemplates entering the chemical field, including petrochemicals. Apart from pioneering new industries, Mr. Sabba's group is also actively participating in modernizing existing power plants by converting wood-burning steam plants to oil-fired installations, and introducing diesel-powered river craft to replace the antiquated wood-burning stern-wheeler.

Considering the planned long-range development, the refinery at Manaus may well be the start of an industrial empire, and the city become one of the important centers of Brazil's industry. At present, the refinery's finished products find their major markets in the northeastern coastal cities such as Belem, Fortaleza, and others. As industries develop at Manaus, it is expected that the local consumption of finished petroleum products will absorb all of the COPAM refinery's present capacity—and, perhaps, call for more such products. Thus, the refinery is intended to be the mainspring in developing its own local markets in the Manaus area.

The fact that the Brazilian government granted a license for the construction of an oil refinery to a private group, while most of the other oil activities in Brazil are exclusively under the direct supervision of Petrobras, the government-controlled oil company, demonstrates the government's faith in Mr. Sabba's ability to carry through this most important project. This same license shows the government's confidence in the tremendous industrial potential of the Amazon valley, and Mr. Sabba's ability to contribute to its development.

Petrobras, under the aggressive leadership of its president, Colonel Janary Gentil Nuñes, has started an exploration and drilling program in the vicinity of Manaus which shows promise of success. Oil has been found in Nova Olinda, some 60 miles northeast of Manaus. The crude-oil supply position of the refinery should become increasingly independent of imports. The location of the refinery should then prove to be increasingly advantageous in relation to crude supplies and markets.

COPAM chose Southwestern Engineering Co., of Los Angeles, to be in charge of design, engineering, procurement, and shipping of materials, and inspection of construction. The construction was performed by Montreal Limitida, a Brazilian company. Upon completion of construction, SWECO was also responsible for start-up operations, training of Brazilian operating personnel, and acceptance guarantee test runs.

The manifold problems attendant on the construction of a refinery at an isolated location such as Manaus are apparent. In addition to the physical distance difficulties, there was an almost complete lack of construction equipment and materials. The trained craftsmen required to construct the complex process plant of a modern oil refinery are found in the major Brazilian cities of Rio de Janeiro and Sao Paulo. These industrial centers are 2,000 air-miles from Manaus. These circumstances presented formidable obstacles. That the refinery is now onstream testifies to the potent combination of American know-how and Brazilian enthusiasm and cooperation.

Labor problems were always acute—not only because of the scarcity of skilled craftsmen in northern Brazil, but also because of the isolated location of Manaus, which offered little attraction to men who were willing to come to Manaus from the industrial centers in the south.

Much of the work—which is usually performed by skilled craftsmen—had, therefore, to be done with available local men who had to be trained for the work.

Manaus, a city of approximately 130,000 people, is located 1,000 miles west of the Atlantic coast in the heart of the Amazon valley jungle. Except for the river, the city is surrounded by almost impenetrable jungle, and completely isolated from the outside world in the sense that beyond the city limits there are not roads. Railroads are also nonexistent in the north. The nearest place of any size is Belem in the state of Para on the Atlantic coast. Manaus is over 2,000 air-miles from Rio de Janeiro and Sao Paulo, the industrial centers in Brazil.

More than 50 years ago, Manaus was the center of the Brazilian rubber industry. This brought much wealth, and stimulated the growth of the city. East Indian natural rubber and the arrival of synthetic rubber meant the end of the rubber boom. The wealth and splendor of the city faded away. Today, Manaus is in a sense a ghost city of what it was at the turn of the century.

Manaus has a modern airport which in the not too distant future will also serve international lines. Apart from air transportation, the Amazon River is the only other connection with the outside world. The river is navigable all year for ocean-going vessels from its delta to Manaus. For six months, the river is navigable as far as Iquitos in Peru, nearly 2,000 river-miles west of Manaus.

The refinery site, about 10 road-miles from the city, is situated on a hill overlooking the river (Fig. 2). The jungle had to be cleared twice because the fertility of the topsoil is such that, during the three months which elapsed between the first clearing and the time when construction started, everything except larger trees had grown up again.

Manaus is 3 deg south of the equator. The climate is tropical and difficult—both for individuals unaccustomed to it and for the conduct of construction operations in general. For five months of the year, during the rainy season, torrential rains caused delays in construction. It was almost impossible to work in these heavy rains which washed out earth gradings, dikes, etc. The rains also filled excavated areas and slowed down unloading and transportation of equipment because of the extreme fluidity of the wet soil.

Essential construction tools such as cranes, power shovels, bulldozers, welding machines, automotive equipment, etc., are,

generally speaking, in short supply in Brazil and almost unavailable in the north. It was, therefore, necessary to import all equipment from the United States. Therefore, considerable ingenuity and improvisation were required in the use of the limited available construction equipment and in transporting construction and heavy refinery equipment from the ships to the refinery site.

While Manaus has extensive and adequate harbor facilities, these could not be used for unloading of the greater part of heavy materials because of the limited load-carrying capacities of the bridges built over several wide inlets of the river. Beyond the city limits, the dirt road from the harbor to the refinery becomes a sea of mud during the rainy season. Therefore, ships had to be anchored in the river opposite the refinery site, and the equipment at the river bank and the equipment moved up to the top of a 100-ft steep hill. Considering the flat contours of the river bank, the average seasonal rise and fall of 50 ft of the river level, the topography of the site, and the sizes and weights of equipment involved, this was a difficult and sometimes hazardous operation. During the rainy season, the problems were greatly aggravated. It is quite remarkable that not only unloading, but also construction, operations were performed without serious accident.

In handling the COPAM project, SWECO was able to draw on its experience in the construction of the Petrobras asphalt plant at Cubatao. This 3,500 b/d installation was designed in cooperation with Standard Oil Co. of California.

The design of the refinery represents a careful interpretation by SWECO of the very specific requirements of the situation, as stated by Messrs. Sabba and Amorim. It employs a compact and integrated processing scheme, consisting of a two-stage 5,000 b/d atmospheric and vacuum-distillation unit and a 2,000 b/d fluid catalytic cracking plant, licensed by Universal Oil Products Co. (Fig. 3). Caustic treating and leading facilities, utilities, can factory, auxiliaries such as warehouse, machine and pipe shops, laboratory, and a river terminal for handling ocean-going tankers are also included.

The plant is designed for maximum heat exchange, thus minimizing additional heat requirements and cooling water. To allow independent operations, if necessary, of the crude and cracking units, FCC feed-stock storage tanks have been supplied. The refinery is sufficiently flexible to handle also other crudes than the stock for which it was designed, and to satisfy fluctuating market requirements of finished products and their specifications.

The plant layout is such that ample space is left over for future expansion of the refinery. Operations are controlled by modern instrumentation housed in a centrally located control room. This makes it possible to handle operations with a minimum of personnel. To facilitate operations, a color scheme has been developed for painting piping and storage tanks—which also contributes to the neat appearance of the refinery.

Two different crude oils are presently processed. One is Peruvian Ganzo Azul crude, which is shipped in river barges of 24,000-bbl capacity from Iquitos, Peru, 2,000 river-miles west of Manaus. The other stock is a Venezuelan crude, which is transported in 100,000-bbl tankers. While possible, it is not advisable to employ larger ships because of difficulties in negotiating the many and often tricky river bends which require extremely accurate navigation.

Fig. 2 Overall view of refinery site showing processing area and tankage: Crude is stored in the large tanks nearest the river; diesel fuel, kerosine, and gasoline in the tanks in left background; fuel oil in the black tanks adjacent to the gasoline tanks. A 100,000-bbl tanker is being loaded and two crude-oil barges are waiting for unloading.

Crude-oil tankage amounts to 240,000 bbl, with rundown and finished-product storage of 260,000 bbl. Sufficient flexibility is thus provided to cope with inventory requirements to meet changed market conditions.

Iquitos crude, received in barges, is pumped to the storage tanks by means of two 1,000-gpm unloading pumps which are located on the river-terminal pontoon. Venezuelan crude is discharged to the tanks by the ship's pumps at an average rate of 2,500 bbl per hour. Finished products for shipment by barges and tankers are loaded by gravity flow. Specifications of the two crudes are as follows:

Test	*Ganzo Azul (Iquitos)*	*Venezuelan Crude*
Gravity, API	43.9	39.8
Total sulfur, % by weight	0.07	0.61
Reid vapor pressure, psi	3.7	10.0
Cold test, deg F	50	30

Actual plant runs resulted in overall liquid recoveries of 96% on the average. Yields of over 63% of motor gasoline are obtained. This gasoline has a Reid vapor pressure of 7.5 psi; a 90% distillation point at 322 F; and a clear octane number (research) of 73.3 which is leaded to 76+ as required by Brazilian specifications. This grade is satisfactory for year-round operations under the climatic conditions in northern Brazil. The other products manufactured at Manaus are LPG, kerosine, diesel and fuel oils.

The refinery is designed for 5,000 b/d crude capacity and 2,000 b/d FCC, but is now running at 25% increased charge.

Utility facilities consist of four boilers, each of 28,000 lb per hour capacity, producing 225 psig superheated steam. An additional supply of 6,600 lb of steam per hour is available from the FCC steam generator. Three 500-kva turbo-generators, plant and instrument air compressors, and a two-cell forced-draft cooling tower complete the utilities. Refinery off-water passes an API oil separator and clear ponds before being returned to the river.

The total value of the project exceeds $5 million, and construction was completed in 18 months. The refinery came onstream, September 6, 1956, and the first consignment of 18,000 bbl of refined products reached Belem early in October.

The refinery was officially inaugurated, January 3, 1957, under the auspices of the President of Brazil, Dr. Juscelino Kubitschek de Olveira, and members of his government (Fig. 4). The presence of President Kubitschek and other political, financial, and industrial leaders indicates the great importance Brazil attaches to the development of the Amazon valley. The completion of the refinery is an important milestone in the realization of the ambitious plans which Mr. Sabba and his associates have conceived for the future industrial development of Amazonas' enormous natural resources. END

Alaskan oil search grows

A dozen oil companies, large and small, have entered the search for oil in Alaska, taking leases over more than a million acres. Local Alaskan companies and individuals have blocked out additional acreage in various parts of the 175,000 square miles of favorable territory.

by Tom Dougherty*

ALASKA seems to have grown tentacles. Begin a search for information on current oil interest in the territory and somewhere along the way you'll find not a stranger with a speculative dream . . . more than likely you'll find a friend in the oil business.

Perhaps he'll be someone long associated with a company of great substance who has suddenly become an expert on Alaska's oil prospects because of his company's interest. Or he may be someone who has gone on his own to develop what he considers a personal opportunity. Or you may find your friend with a moderate to good-sized independent firm which has taken a toehold in Alaska.

The point is that this new interest has threaded its way into the domestic oil industry to a degree unrealized by most oilmen. There'll be no "Yukon oil rush," but the list of companies with Alaskan interests grows steadily longer, and the operations projected there grow more ambitious by accretion.

Phillips Petroleum and Kerr-McGee Oil Industries got headlines when they entered Alaskan exploration several years ago. Their interest has been well publicized. But the list has expanded. Shell Oil, Ohio Oil, Richfield Oil, Sunray Mid-Continent Oil, General Petroleum are among the big operators which have come recently to Alaska. Union Oil of California is another. Standard Oil of California was in the Kenai peninsula a little ahead of most of these, and can be considered among the earlier major companies. Colorado Oil & Gas took Alaska holdings in 1956, as did Texota Oil, Denver and Fort Worth independent.

In addition, leases have been taken by numerous individuals, and by a considerable list of Alaskan companies dedicated to development of the petroleum prospects of the territory. Some of these get some of the credit for entry of major companies. They aroused interest, and had blocks assembled and waiting . . . as has always been the case where a land play is possible.

Except for the US Navy, no operator has found any oil since 1901, but then the actual drilling which has been done is almost negligible in view of the territory to be explored. Discoveries by the Navy were in northern Alaska . . . about as far from the territory or US markets as possible. Exploration there, however, placed emphasis on other factors than market availability.

Current commercial interest is directed to areas much more advantageously situated as to markets. Both territorial markets and US markets are within economic reach of the principal areas now marked for activity, or actually undergoing exploration. Both types of markets are important. Territorial markets would be small by comparison with the US proper. Certainly, high-grade motor fuels would not be a major civilian market consideration. However, there is a great need for lesser fuels in Alaska.

When asked: "What would you do with oil if you found it?" operators interested in Alaska almost universally mention local demand: "At least for a nominal amount of production which would help make some return of investment possible." Fairbanks, for instance, is so interested in the possibility of lower-cost fuel that the Alaska Development Board in 1954 issued a survey of the proposition of a natural-gas pipeline from the Gubik gas field, across the Brooks Range, to supply the city. A volume of some 20 million cubic feet per day through a 10-in., 465-mile long line, to cost more than $20 million, was considered.

Other demand in the Railbelt area was not considered in this basic plan. Discovery of gas or oil within a more reasonable distance would be considered a major boon to Alaskan economy. At least two of the areas now under substantial consideration could offer lower-cost fuel to this area. Also, discovery in southeastern Alaska or in the Cook Inlet area would allow tankship movement to Puget Sound at rates more than competitive with present or envisioned sources of supply there, and the entire Pacific Coast would eventually enter the Alaskan market situation.

Given markets, given available prospects favorable to oil accumulation, it is inevitable that eventual exploration for oil will develop. Alaska is now apparently at the threshold of a considerable era of exploratory activity.

This hasn't come about overnight, but has been building up for some time. It has been aided by favorable changes in land administration, and by the long strides made toward solution of problems presented by terrain and climate. Operations in the areas now active do not seem so formidable as they would have a few years ago.

Three general areas of current or scheduled activity are readily refined. These are the Katalla-Yakataga area at the north end of the Gulf of Alaska, the Kenai peninsula on the east side of the Cook Inlet, and the Koyukuk basin west of Fairbanks in central Alaska. Other areas which should be mentioned include the Iniskin peninsula across Cook Inlet from Kenai, and the Wide Bay

* Petroleum Information, Denver, Colo.

area on the Alaska peninsula. Drilling has also been done in the Nelchina area east of Anchorage.

These areas do not include districts where early geologic work is or has been in progress. They are, rather, areas where leasing, seismic exploration, or actual drilling is being or has been done.

Petroleum history in Alaska begins in 1901, when Chilkat Oil Co. drilled a shallow producer in the Katalla area. Over the next 18 years several shallow holes were drilled in this area, and a topping plant was operated there until the early '30's, when it was destroyed by fire. During this time nearly 155,000 bbl of oil were produced and processed, according to the best information available. Activity in this area persisted during the time when Alaskan lands were withdrawn. Operations were on patented claims. This area is now leased by Phillips Petroleum, and is under exploration by Phillips and Kerr-McGee.

Meade No. 1 test well at Point Barrow Alaska. Photo courtesy United States Navy.

Like the drilling done by the Navy in northern Alaska, the location for early drilling on the south coast was determined by seeps and other surface evidence which had been known for some time.

The Phillips concession includes more than 1,023,000 acres. It was largely assembled by Northern Development Co. Under terms of the Phillips agreement with the government, 12 exploratory wells will be drilled in the 10-year period beginning in 1953. One well was completed in May 1954, to a total depth of a little more than 4,800 ft. A second well, completed in 1955, went to a depth of 10,013 ft, and operators reported nearly 400 ft of good sand below 8,500 ft. Shows found in this zone were not commercial.

Near the end of 1956, Phillips and Kerr-McGee were reported nearing 10,000 ft in a third well, with "some shows" reported. Details are not given.

Colorado Oil & Gas Co., of Denver, production affiliate of Colorado Interstate Gas, acquired a block of 1,200,000 acres in the Icy Bay area early in 1956. Early in 1957 Colorado Oil & Gas spudded 1 Yakutat, ne ne ne 5-28s-34e. It was drilled to a total depth of 9,314 ft and temporarily abandoned due to mechanical difficulties. Several shows were reported—although full appraisal has not been made. Late in June, the rig was moved 3½ miles to the east and spudded 1-A Yakutat, c se se 2-28s-34e. Objective depth is 9,000 ft.

Other important holdings in the south coast area include more than 100,000 acres near Icy Bay, which was optioned to Standard Oil of California in 1954. This firm was the second major company to enter Alaska. Leases are held on the Kenai peninsula, in addition to those at Icy Bay. Standard of California has not moved with haste on its Alaska holdings. It has done some seismic and surface work, at least in the Kenai peninsula area. Terms of the company's agreement do not enforce quick action. An expenditure of $450,000 on preliminary work by the end of 1958 is required. If it wishes to retain interests after that time, it must start an exploratory well by the middle of 1959.

On the Kenai peninsula, possibilities for explosive action in the event of success are perhaps greater than anywhere else in the territory at the present time. Standard of California is the pioneer in this area. It acquired more than 330,000 acres on the southwestern portion of the peninsula in 1954. A portion of the company's holdings is also toward the east side of the peninsula proper and immediately south of Tustamena Lake. Union-Ohio, Richfield, Sunray Mid-Continent, General Petroleum, and Richfield also hold acreage south of Tustamena. Shell has holdings circling approximately the western half of the lake's perimeter.

Major holdings of Union-Ohio and Richfield are north of Tustamena. In this area also are located some holdings of Phillips Petroleum, McGreghar Land Co., and Sunray Mid-Continent.

Richfield Oil has unitized the 100,000-acre Swanson River block near the northern end of the peninsula, and has drilled 1 Swanson River, c sw se 10-8n-9w to 9,225 ft. The well was made a tight hole considerably above this last reported total depth, and no indication of current possibilities is available. About 88% of the unit is Richfield acreage, with some Union-Ohio holdings at the south end. Between the unit area and tidewater, Sunray Mid-Continent controls a 50% checkerboard. Phillips has a block joining the unit on the east side.

In round figures, these are the known holdings on the Kenai peninsula: Standard Oil of California, 335,000 acres; Union-Ohio, upwards of 250,000 acres; Richfield, 150,000 acres; Shell, 40,000 acres; General Petroleum, 40,000 acres. Also, Phillips Petroleum 60,000 acres; and McGreghar Land Co., 60,000 acres. Other lands north and east of major holdings in the area are by Alaskans . . . principally residents of Anchorage.

Lands on this peninsula leased by individuals and turned over to majors went from 65 cents to $2.00 per acre, with overrides in the vicinity of 5%. It must be remembered that 3-year rentals in Alaska are 25 cents per acre, and that government royalties are fixed at 5% for the first 10 years following discovery, advancing thereafter to 12½%. Land provisions are instrumental in generating interest which is now being expressed. To date, informed observers "guesstimate" that $1.5 million has been spent on Kenai leases, and that geological work has amounted to something near $2 million.

Standard Oil Co. of California, Western Operations Inc., and Richfield Oil Corp. have announced they entered an agreement for the joint exploration and development of their land holdings on the Kenai peninsula. California Standard will be the operator and, under the agreement, will spend $30 million over the next several years in exploring and developing the properties.

Included in the agreement is the Swanson River unit, embracing 71,600 acres of federal land on which Richfield already completed the first discovery well on the peninsula, 40 miles southwest of Anchorage—flowing at the rate of 900 b/d. Location has been made for the drilling of a second well on the unit, approximately two miles south of the discovery well.

Across the Cook Inlet, in the Iniskin peninsula area. Havenstrite Oil drilled a well to 8,700 ft, between 1936 and 1940. A second well, on the Fitz Creek anticline, was begun in 1954. It is suspended at 9,745 ft, and the operator has run logs. High-gravity oil shows were found between 6,000 ft. and 7,000 ft in this well, offering the possibility that resumption of operations may see casing set for further testing. Havenstrite controls a block of roughly 60,000 acres here.

At mid-July, Havenstrite was conducting further tests on the Fitz Creek anticline well. It was tight, and company spokesmen commenting on rumors of success would only say: "We are keeping our fingers crossed."

Further southwest, along the Alaska pen-

Oblique airphoto of mountainous terrain typical of southwestern Alaska, where several major oil companies are conducting geological and geophysical mapping. The rugged topography and inaccessibility render ground exploration very difficult. However, photogeology provides valuable data for planning necessary detailed operation.

insula, Shell Oil has holdings estimated at half a million acres in the Wide Bay-Cold Bay area which, like the Iniskin area, was the site of prewar activity.

Three wells have been drilled north and northeast of Anchorage. This activity was by Alaska Oil & Gas, by anchorage Gas and Oil, and by Alaska Gulf Oil. Holdings of these firms in this general area range from 65,000 to more than 85,000 acres each.

One of the more interesting recent developments in the territory is the forthcoming test of the Koyukuk basin in the interior. Texota Oil, of Denver, affiliated with F. Kirk Johnson interests of Fort Worth, holds leases on a block of 400,000 acres on the Kateel River, north of its junction with the Koyukuk River. Associates in this holding include actor James Stewart and his wife. Acreage here was acquired in 1954. In 1956, Texota leased approximately 112,000 acres farther south in the vicinity of the junction of the Koyukuk and the Yukon Rivers.

Both areas have had ground and photogeologic work done. Geophoto Services, Denver, has completed photogeologic mapping of the areas involved. A location has been selected on the north bank of the Yukon River for a test of the company's southern block. Location is on the basis of surface geology, and a reversal of as much as 4,000 ft is evident in the structure to be tested.

The Koyukuk Cretaceous basin contains sediments of as much as 25,000 ft in depth. The upper 7,500 ft of sediments in the basin are regarded as most favorable to oil and gas accumulation. Thus the anticipated depth of the first test planned is about 7,500 ft.

The basin is bounded by the northeast-southeast oriented Ruby geanticline on the east, by the Brooks Range on the north, and extends westward to the Seward peninsula. The geosynclinal axis of the basin follows a northeast-southwest trend interrupted by the Hogatza Uplift in the northeastern third of the basin. The Yukon River enters the basin about midway of its eastern border. The basin is highly disturbed, particularly in the western and southwestern portion. The area in which Texota has holdings is one of less violent tectonics. The accompanying illustrations convey some impression of terrain to be dealt with.

Importance of the Texota venture is that it begins the exploration of the territory's interior, where little attempt has been made

Vertical airphoto showing anticline which separates two synclines mapped on outcrops of the Shaktolik group of sandstones and shales of the Lower Cretaceous age in the Koyukuk basin, 300 miles west of Fairbanks. Test wells are projected both east and west of the area pictured. Conditions conducive to oil accumulation are believed to exist in the upper 7,500 ft of geological section.

to find oil or gas. Promise of definite action, however, follows additional activity in this part of the territory by the US Geological Survey. Texota's interest was focussed on the Koyukuk basin by residents of Fairbanks who had investigated the area, and were convinced of promise justifying investigation. Fairbanks Oil & Gas Co. was the principal agent in this respect.

It is interesting to note that among the personnel of the Fairbanks company are men who had been associated with the Navy project at Point Barrow.

Considerable discussion of the logistics involved in exploration for other areas of Alaska has been published previously. The plan of operations in the Koyukuk area is of somewhat different nature. Present plans call for movement of equipment to Anchorage by water. It would then be shipped to Fairbanks via the Alaska Railroad. From Fairbanks it will be barged down the Tanana River to the Yukon, and then to the location some 12 miles below the junction of the Koyukuk and the Yukon.

Equipment for drilling at a greater distance from the river, or on the northern block in the Kateel River area, will be handled as in other areas, most likely by cat-train before streams have thawed. Ice break on the Yukon will make down-river barging possible about June 15.

Preliminary work has indicated a choice of several locations well located structurally on surface geology. Initial drilling will offer guidance as to what may be expected in other areas of the Koyukuk basin.

Initial drilling on Texota holdings was originally contemplated for the summer of 1957. Other interests of this firm dictated delay—with 1958 drilling now a possibility. In the meantime, substantial leasehold in the area has been acquired by other operators. Three million acres are now reported leased in the general vicinity of the confluence of the Koyukuk and Yukon Rivers.

Paul Benedum interests, Texas National Petroleum, Shiprock Industries, Schlitz Brewing, and others have recently acquired acreage in the Koyukuk basin.

Global Enterprises, Denver, has been active throughout the past summer. Global is a geological and engineering consulting firm headed by Raymond Thompson, formerly manager for Benedum in the Rocky Mountains and with the Navy's Alaskan project during World War II. Four Global surface parties and a Heiland Exploration seismic crew have been working for the account of the Benedum and other interests mentioned above.

Following this program, Benedum reportedly plans at least one deep test in the area.

Additional reconnaissance has been done in a number of areas through the territory. The Yukon Flats area, northeast of Fairbanks, is one of these. As yet, however, no action so conclusive as leasing has resulted.

Discussion of possible restoration of the withdrawn lands north of the Brooks Range outside the Naval Petroleum Reserve proper has been heard for some time. The Navy has indicated that it would have no objections to this restoration. Restoration, if carried out, will affect more than 20 million acres. A sizeable lease play could result, in view of interest which has been shown in other areas of the territory.

Major oil-company leaseholds in Alaska.

Logistics of exploration and production, not to mention transportation to market, come first to mind in a discussion of Alaskan petroleum prospects. Alaska hands, however, remind one that during the past 10 years full-scale oil operations have been carried out under conditions almost as rigorous. As a matter of fact, men who spent years with the Navy at Point Barrow point out that information gained at Barrow helped in the development of operational techniques in other colder areas.

In geophysical operations, for instance, certain types of insulation for geophone cables cracked like macaroni when reeling was attempted at temperatures well below zero. This difficulty has since been largely overcome. Cable slippage and sticking during logging operations was another troublesome item in naval operations at Barrow. But the fact remains that $36 million spent by the Navy in the Barrow operation found an oil field of 30 million to 100 million barrels . . . conservatively estimated, a gas field rated at least at 300 billion cubic feet, and other apparently smaller producing areas.

Development has not proceeded to any great length in any of these areas. Substantial adjustments of reserves estimates above those which now seem conservative could result from further drilling.

A total of nearly 175,000 square miles within Alaska's 586,000-square-mile area is listed as favorable or possible for oil or gas accumulation. Already it has become difficult to determine where blocks are now being put together in Alaska. Spread of interest dictates caginess in operations. If any one of the several wildcats known to be coming up in Alaska in 1957 is successful, a new petroleum province will pop wide open, foreseen problems notwithstanding.

But the important thing is . . . Alaskan interest has gone far enough already, and commitments are sufficient that several years of definite effort are already assured. Under the circumstances, few substantial operators are going to risk being "left out in the cold." The list of major interests in Alaska at the end of 1957 will be considerably longer than it was when 1956 ended.

END

Dollars for Mexico's oil?

by Art Geiger

Solution to Mexico's oil problem lies in an injection of dollar capital in very substantial amounts. While progress has been made in all sectors of Mexico's oil industry, its very special history and position as a government monopoly have made it vulnerable to increased costs. Especially important in this regard are the high cost of labor's extra benefits, a tax position less favorable than that enjoyed by many private companies in Mexico, and, especially, the artificially low internal levels in Mexico which force Pemex to sell at a loss.

The result, in Pemex' words, is lack of adequate financing in all branches of the industry. Despite several offers, including those from Europe and from Russia, Pemex looks to private capital from the United States as the most satisfactory source.

With an income of 3,573,474,000 pesos annually (about $398 million), Petroleos Mexicanos is apparently the biggest money maker of any industrial enterprise in Mexico—or it should be. But like many a private oil company elsewhere, the Mexican government agency is learning maintenance of a vast and growing establishment often involves expenditures in the same, or greater, proportions.

Last year was a boom year for the Mexican oil industry. Domestic demand for middle distillates such as diesel oil and kerosine soared to where it is estimated it will this year almost equal gasoline demand. Domestic consumption of all its products jumped to 238,600 b/d. Although exports fell from 25,833,602 bbl to 23,722,020 bbl, production of crude, distillates, and absorption liquids rose to 94,096,355 bbl from 91,370,125—a daily average of 257,094. Natural-gas production reached 124.8 mmcf, and proved reserves in northeastern Mexico alone ballooned to 2.8 mmcf—"much more than the demand which can be developed in the next 20 years," as Pemex puts it. Processing of crude mounted to 82,060,563 bbl as the Reynosa primary distillation plant's capacity was extended to 10,000 b/d and the same refinery's thermal disintegration unit went into operation with a capacity of 2,000 b/d. The capacity of distribution centers was increased by some 25 million liters (about 15 million barrels), to a record breaking 451 million liters. Forty-five exploration crews were added to the 511 already functioning—including the contracting of American submarine drillers. Four hundred and two wells were completed—a 22% advance, and highest since 1938. Three pipelines—two for crude and one for refined products—were constructed, and the building of a gas duct from the northeastern fields to industrial Monterrey got under way.

In general, this was most satisfactory—marred, however, by a single serious drawback: To foot the bill for this expansion,

Caterpillar D8 preparing site for new Pemex drilling operations, Poza Rica Field.

Pemex had only 901,728,884.10 pesos (about $75 million) to invest—and the major part of this sum had to come out of its own pockets. This figure, moreover, represents a decline from the 988,570,108.04 (about $82 million) available the preceding year.

A private oil company might write down these expenses as "normal operating costs." But, in the case of the government oil agency, the situation is complicated by a number of unusual factors—mostly unfavorable—which have to go on the books in red ink.

Owing to the peculiar circumstances surrounding its birth, the nationalized Mexican industry is regarded locally as at least partly a philanthropic institution. Its officials are justly proud of its labor-relations policy. Not only do employees receive the best wages of any comparable group in the country, but they and their families enjoy model housing, hospitalization, and schooling; work clothing, baseball stadiums, sports centers, and special motion-picture palaces and theatres for their recreation. At present, Pemex is building an entire city with all the modern comforts for its employees in Macuspana, Tabasco. The workers are encouraged to save, and some of them are now planning to erect a 5 million peso ($400,000) luxury hotel in the Hollywood resort of Acapulco for their vacations.

Although a policy of this kind undoubtedly would rank high in the annals of social welfare, it is obviously not what a cost accountant would recommend for reducing expenses. And, although Pemex as a State agency might seem a logical candidate for special consideration at the hands of the tax collectors, this is not the case. In sharp contrast with numerous private enterprises —such as small mining companies, which are granted discounts up to 75% on the usual levies and certain foreign corporations which have been awarded substantial exemptions to induce them to open branches in Mexico—the oil industry last year forked out 445,552,500 pesos ($36 million) to the Federal treasury as well as 32,214,000 pesos ($3 million) to the states and municipalities. In addition, it has to pick up the tab for "subsidies"—below-cost prices for oil products used by light and power plants, mines, truck and bus lines, and even taxicab operators. Last year this "aid to low-income groups" set Pemex back 389,639,500 pesos (about $32.5 million).

But the most serious problem confronting Petroleos Mexicanos has been the importation of refined products—gasoline, kerosine, and diesel oil, in the opinion of Director Antonio J. Bermudez. "The enormous distances of our territory, the lack of adequate transportation and, above all, the absence of complete installations in our refineries, have forced us to import products for the northern and western (Mexico) markets," he states.

"Exports exceed imports by a wide margin. But, since the prices of the light products imported are higher than those of the crude and heavy fuels exported, the balance in pesos has been unfavorable. This is a grave problem with two important disadvantages: (1) For the nation, it means an outlay of exchange that ascended to over $70 million in 1956; and (2) the oil industry is deprived of funds for heavy investments, owing to its obligation to market products below their cost. Diesel fuel that costs us 46.2 Mexican centavos a liter, for example, we sells for 17.9, losing 28.3 centavos a liter. 'Tractomex' and diaphanous combustible cost us 44.4 centavos a liter; we sell them at 13.1, losing 31.3 centavos a liter. Fuel oil costs us 29.2 centavos a liter; we sell it at 13.9, losing 15.3 centavos a liter." (These prices are wholesale averages for the North and West, which depend upon imports.)

Pemex officials claim they are satisfied with this assistance, which they view as "a contribution toward the economic progress of zones dependent on imports, such as northern Tamaulipas; the states of Nuevo Leon, Coahuila, Chihuahua, Sonora, Sinaloa, and Lower California, as well as the Territory of the same name." But there can be no doubt, on the other hand, the subsidies constitute a formidable handicap to rapid realization of the very projects, such as the Madero City and Salamanca catalytic plants, required to "reduce imports to economic and convenient levels."

Recently, Petroleos Mexicanos has turned to the buying of gasoline from Venezuela and crude from Aruba, in the Dutch West Indies, in an attempt to lighten this burden. Its executives contend the purchases permit a "considerable saving" from the amounts previously spent on American gasoline for isolated North Mexico consumers. Nevertheless, it is clear to all concerned that these measures are hardly more than a drop in the bucket of what is needed. Or, as Director Bermudez frankly admits: "We lack an adequate financing system—a system that will enable us to keep investments in every branch of the industry to the mark demanded by the national interest."

Virtually every important sector of Mexico's economy agrees the oil industry is badly in want of a substantial injection of working capital, and an extensive assortment of remedies have been prescribed. Among the most popular at the moment are a mark-up in prices, elimination of the anti-economic subsidies, issuance of 2 billion pesos (about $166 million) worth of oil stocks backed by the federal government, and tax exemptions similar to those granted the Mexican Light and Power Co., a private foreign-controlled enterprise.

These "solutions" have won powerful support from such varied sectors as the conservative National Action Party, the mining industry, and Hidalgo farmers—many of whom benefit from the subsidies but who have gone on record as willing to sacrifice their advantages as a patriotic gesture; industrial consultants headed by Jorge Schantz and Emilio Mujica; and a bloc of radical industrialists led by Jose Domingo Lavin, who argue: "If we dedicate to Pemex all the subsidies, gifts, condonations, and other privileges given to many foreign firms, we could invest in Pemex hundreds of millions of pesos now wasted"; the Oil Workers Union whose members have announced they "will not permit the infiltration of foreign capital in the national petroleum industry for any reason"; and the Confederation of Chambers of Industry,

which is waging a nationwide crusade among businessmen for domestic solution of Pemex' No. 1 problem.

That such odd bedfellows should be united in their insistence that financial assistance to the oil industry should come from within the country underlines an outstanding fact which will have to be considered by promoters of any aid plan: By far the greatest part of Mexican objections to help are not so much directed at its nature as to its source. This is substantiated by the chilly reception tendered the advice of Salvador Ugarte, president of the Mexican Bankers Assn., that domestic investors could not possibly put up sufficient dollar credits for the purchase of petroleum equipment, and by the reported secret conclusion of the Industrial Congress that "Mexico does not possess the economic elements to finance Pemex and should recur to foreign financing."

As a matter of record, there has been no shortage of offers of aid from abroad. During the past two or three years, says Director Bermudez, several European nations have sounded out Pemex on this matter, but nothing "concrete" has ever come of them. Even the Russians have occasionally sent up trial balloons from their Mexico City embassy, avowing their willingness to barter machinery and power plants for Mexican crude—though nobody has ever paid much attention to them. In spite of the abundance of offers, Bermudez has made it evident he is not closing the door to further proposals. "When there is something serious, it will immediately be made public," he has promised.

What is believed to be the first specific proposition of this kind was recently made by a combine of five French banks, who proffered $50 million worth of credits to Pemex for the acquisition of petroleum equipment. The institutions concerned are the Banque Nationale pour le Commerce et l'Industrie, Banque de Paris et des Pays-Bas, Credit Lyonnais, Union Europeéne Industriéille et Finançière, and Worms et Cie.

As submitted to Pemex, the terms are: (1) purchase of the equipment from France; (2) payment within five years from delivery; (3) interest of 2.75% above the official discount fixed by the Bank of France, with a ceiling of 6.75%; (4) free choice by Pemex of suppliers, subject to approval by the combine; (5) prices corresponding to "normal quotations on the international market"; (6) equipment ordered would be built to Pemex specifications, with engineering handled by American firms, assembly left to Mexicans.

The plan is said to be an outgrowth of a previous offer from the Compania Mexicana de Comercio Exterior, made under the sponsorship of the Banque Nationale pour le Commerce et l'Industrie. A director of the last-named organization suggested the possibility of securing French financing; and, when two other French banks contacted Pemex, the oil agency commissioned Luis G. Legoretta, general manager of the National Bank of Mexico, to coordinate their conditions. This was done with the cooperation of the French Economic Affairs Ministry, and the joint bid is the result.

Among the advantages cited on its behalf are that the $50 million sum is "merely nominal" and could be doubled if Mexico says the word, and the spreading of payments over a much longer period than customary—presumably while the equipment is already rendering returns. But there are also disadvantages, as Mexican economic experts have been quick to point out. The offer is not really a cash loan but, rather, an effort to sell Mexico machinery on the installment plan. The machinery would have to be adjusted—with an extra outlay of time and money—to existing installations, all American in origin. The top interest rate of 6.75% is well above the 4.75% charged by American lending institutions. And, finally, the distance between Europe and Mexico might create shipping difficulties.

For the above reasons, impartial observers here believe it is "improbable" Mexico will accept the French arrangement—although, in the final analysis, it will be President Adolfo Ruiz Cortines who will make the decision. A key advisory role is being played by Antonio Ruiz Carrillo, Pemex official who at this writing is in Europe gathering material for a detailed report as to its possibilities.

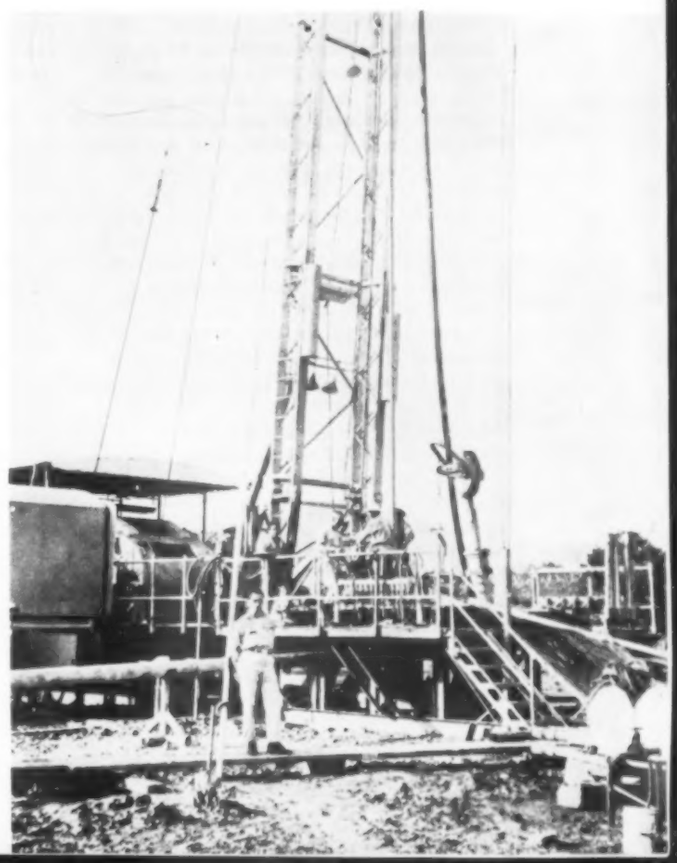
If the French deal is rejected or just quietly allowed to die, and domestic aid is discarded as impractical, where can the Mexican oil industry look for the financing vital to its progress? Many first-ranking economists are convinced there is only one alternative—the United States. But even here the paths leading to a mutually satisfactory accord on this subject are strewn with obstacles on both sides of the border.

Some surprising light was thrown upon the complications of a USA oil loan to Mexico by Senator Wayne Morse (D., Oregon), chairman of the Senate Foreign Affairs Committee's Latin American subcommittee, during his questioning of Roy R. Rubottom, recently named Assistant Secretary of State in charge of Latin American Affairs, and the new ambassador to Mexico, Robert C. Hill. The matter came to a head when "political circles" in Washington confided to the press that the administration is considering lending $200 million to $300 million to Mexico for the "rehabilitation" of its oil industry.

Not the least of the surprises pulled by Morse out of Rubottom's hat was the latter's admission that nobody is responsible for the government's oil policy. "Orientations of the US policy are prepared by various dependencies of the executive branch, including the State and Treasury Departments and the Export-Import Bank," he explained. "The National Consultative Council has the mission of approving applications, so that no agency or individual is responsible for such orientations."

"The US government has concluded the exploitation of petroleum is peculiarly attractive to private investors. For this reason, the United States has adopted the position of not extending loans for development of the oil industry, since capital is available from private sources. Mexico has not received credits from the American government for development of its oil deposits except for a small sum furnished during the war for a refinery. The United States is very much interested in the progress of Mexico; but, in respect to petroleum, the policy established for the world in general will have to be observed."

Asked directly whether certain important USA oil companies are strongly opposed to American loans to the Mexican industry,



Trailer-mounted drilling rig, owned by Sharmex, S.A. operating under drilling contract to Pemex.

as Morse said he had "heard it said," Rubottom responded "so far as I know, no oil company has interested itself in whether the State Department delivers credits to Pemex."

In a prepared statement, the Assistant Secretary of State enlarged upon the reasons he believes any USA financing of Pemex should be private enterprise's baby. For one thing, he said, it is "the policy of the Export-Import Bank not to compete with private banks or other private sources of capital and, therefore, does not concede credits when private capital is available in sufficient quantities and upon reasonable terms." After careful study of the "costs and risks" of the oil business, the government decided some time ago this business is "particularly attractive to private investors," who are "willing to go anywhere in search of petroleum, provided the conditions are reasonable. Exploration for petroleum development and production generally calls for the risking of huge amounts of capital, a superlative degree of technical ability, foreign marketing of surpluses and, since the competition is severe except in wartime, the utmost efficiency in operation and planning. Consequently, it is a field especially appropriate for private enterprise."

Morse's grilling of Hill was more intensive if less lengthy. When he put to the envoy the same query he had asked Rubottom—"Isn't it true the large American oil companies, since the expropriation, have made energetic representations to the State Department against a loan to Pemex?" he got this reply: "I can't answer your question, Senator. I don't know the situation. I will not be an instrument of special interests in Mexico or anywhere else. I'll study the case. If I am requested to make a recommendation, I'll do it on the basis of the facts."

Stressing that he will not approach the question with "preconceived opinions," Hill said he was not familiar "with what the Mexican government thinks about loans to its oil industry because I have not been in touch with the situation. But I can assure you I will go in an impartial spirit and will accept an invitation from the Mexican government, if it sends me one, to visit the Mexican oil installations in order to become well informed." While this affirmation was interpreted in some quarters as signifying Washington may be contemplating a reversal of its stand against a government oil loan to Mexico, others emphasized it is an ambassador's job to carry out policy rather than to formulate it. Nevertheless, it was noted there have been occasions when diplomatic recommendations have changed the course of national policies.

Although Rubottom had told Morse the direction of Latin American affairs "does not reside in Baltimore," where Dr. Milton Eisenhower, the President's brother, heads Johns Hopkins University, it was the new triple-play combination of Milton, Rubottom, and Morse who turned up at an August press conference in Mexico City on Mexican-American relations. The doctor, however, jovially dodged quizzing by reporters with the observation he was only a visiting college professor and not in a position to discuss the two countries' problems, though Rubottom could. As Hill likewise remained discreetly silent, Rubottom—looking none too happy about it—resignedly took over the floor.

The Assistant Secretary of State appeared extremely cautious. Asked about American investments in Mexico, he vouchsafed the opinion they are "beneficial." "American investors pay good salaries to their employees," he said. "They build hospitals, schools, and roads. These investments in turn bring them a modest and just interest. There are, however, projects in some countries which are not so attractive to private enterprise. In these cases, public and official capital is utilized. During the present US administration, more than $1 billion have been lent for this type of projects."

When the inevitable query came up as to whether the US attitude in relation to the Mexican oil industry is "disciplinary," Rubottom withdrew even further into his shell. "No," he answered. "We have no disciplinary attitude with respect to petroleum in Mexico. On the contrary, (we) hope you will broaden your activities in this field."

Dr. Milton's only comment was "I am thinking of re-examining all those problems and I'll inform my brother as accurately as I can. The progress (of Mexico) has been phenomenal and I want to know how it has been accomplished." During his stay, he passed a good part of the time seeing the tourist sights, fishing in Acapulco, and being guest of honor at a presidential banquet. He also posed shaking hands with Pemex director Bermudez—although what they talked about was not disclosed.

Meanwhile, representatives of Mexico City lending institutions confirmed the willingness of American private financiers to provide the Mexican oil industry with all the credits it needs for expansion, without a government guarantee but with the provision that "certain barriers" to Pemex' progress, such as the "sale of oil products at prices below their commercial value," be eliminated. From an investment point of view, they summarized the oil agency's situation as follows:

1. "The Mexican oil industry urgently requires investments not merely to accelerate its growth, but to enable it to respond to the economic reality of a constant increase in internal consumption."

2. "Financing of a broad plan, which would take in exploration, drilling, production, refining, distribution, exportation, etc., is looked upon favorably by both Mexican and American capitalists."

3. "The eminently Mexican character of the industry should be underlined not because it is under discussion, but because of the sensitivity of groups who are trying to create confusion and impede attainment of better results in the exploitation of the petroleum wealth."

4. "Security of amortization would be based upon the usual terms of a banking operation between private parties."

The reasons for their optimism as to the Mexican industry's future, they added, are Pemex' success in increasing production; the probability of further increases to "unexpected" levels through expansion of productive capacity by improvement of exploration, drilling, installations, refineries, shipping, and distribution; the general economic progress of the country, as reflected in the swelling demand for petroleum, which should be satisfied without importation which drains off dollar reserves; and the "absolute certainty" Mexico has enough reserves to cover the national market and leave surpluses for exportation.

While the size of the total investment for the achievement of these objectives is "large"—no figures were given—the financiers predicted the improvements will bring in so much additional revenue they will practically pay for themselves. As they visualize the project, domestic funds, while too limited to pay the entire cost, nevertheless should be the foundation of the program, with foreign capital cast in a complementary roll.

Which of these roads, if any, will Pemex follow?

Despite strong domestic pressure in favor of 100% Mexican financing, this would seem to be excluded by local banks' admission there is simply not enough capital in Mexico—and particularly dollar exchange—for an investment of this magnitude. The French offer of credits for buying equipment has been criticized as incomplete, excessively expensive, and too hemmed in by restrictions, and probably will be shelved against an unexpected emergency. A direct USA government loan likewise appears remote at this time if Washington's declarations are to be accepted at their face value —although the "wartime exception" referred to by Rubottom could be construed as a precedent.

Nevertheless, there are those on both sides of the loan fence who believe Dr. Milton's Mexican fishing trip and his promise to talk over "those problems" with Brother Ike, Ambassador Hill's self-invitation to tour Pemex installations, and Secretary Rubottom's assurance of the "sympathy and hope" of the United States—plus his repeated emphasis that oil loans are "peculiarly attractive" to American investors—may be a first step toward the "something serious" mentioned by Pemex director Bermudez.

While the latter denies the oil agency in his charge has requested a US *government* loan (our italics), or that "any person is authorized to do so in the name of Petroleos Mexicanos," he has advised correspondents "if Petroleos Mexicanos signs any contract for financing, the corresponding information will be given out opportunely." In short, through a process of gradual elimination, all the possibilities for an oil loan to Mexico seem to be boiling down to one—namely financing by American private investors. END

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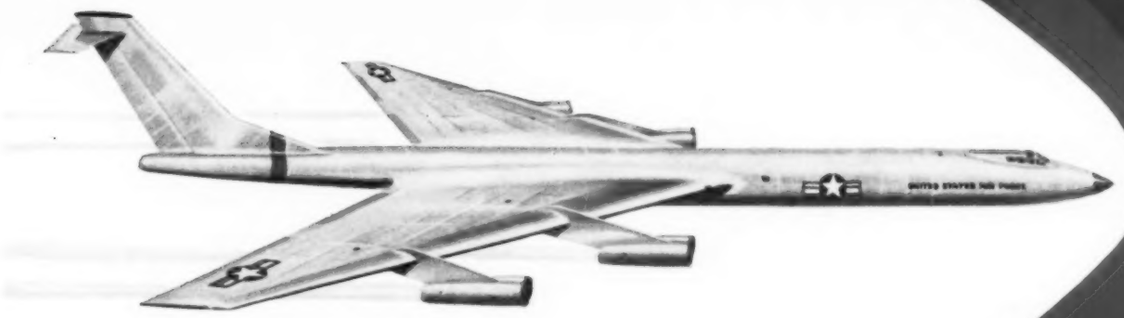

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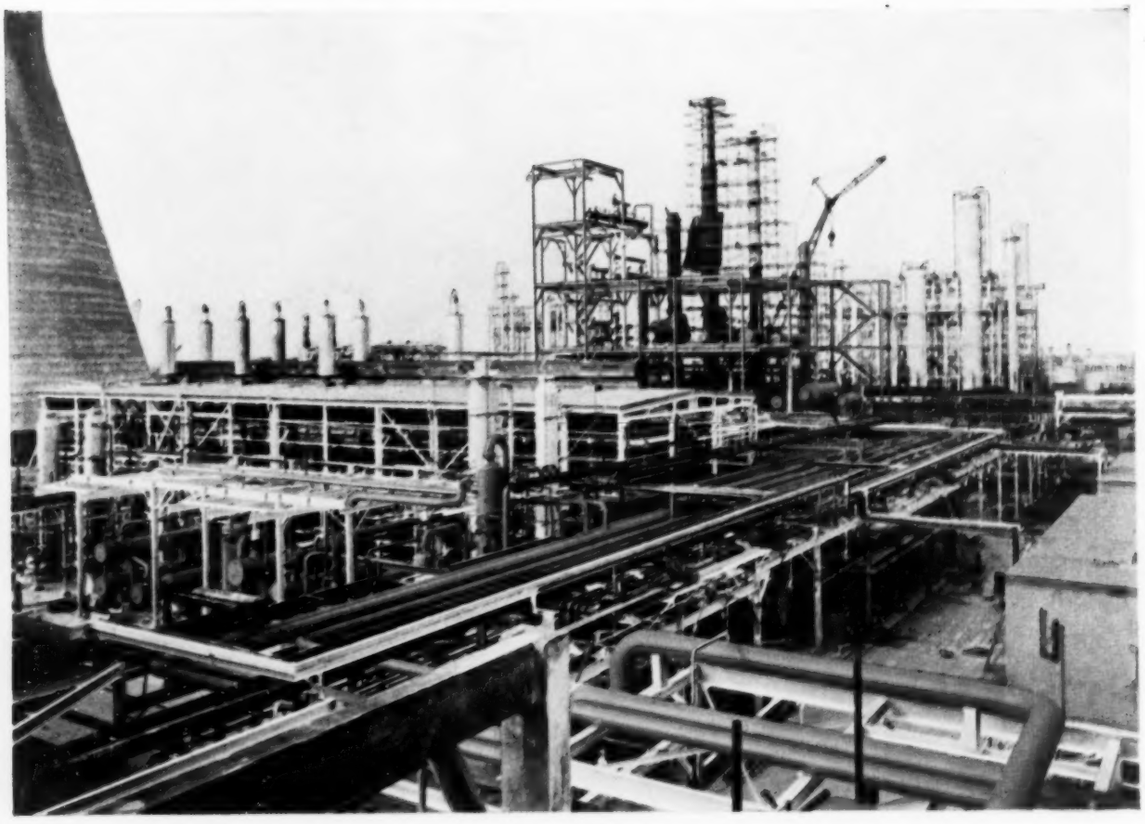

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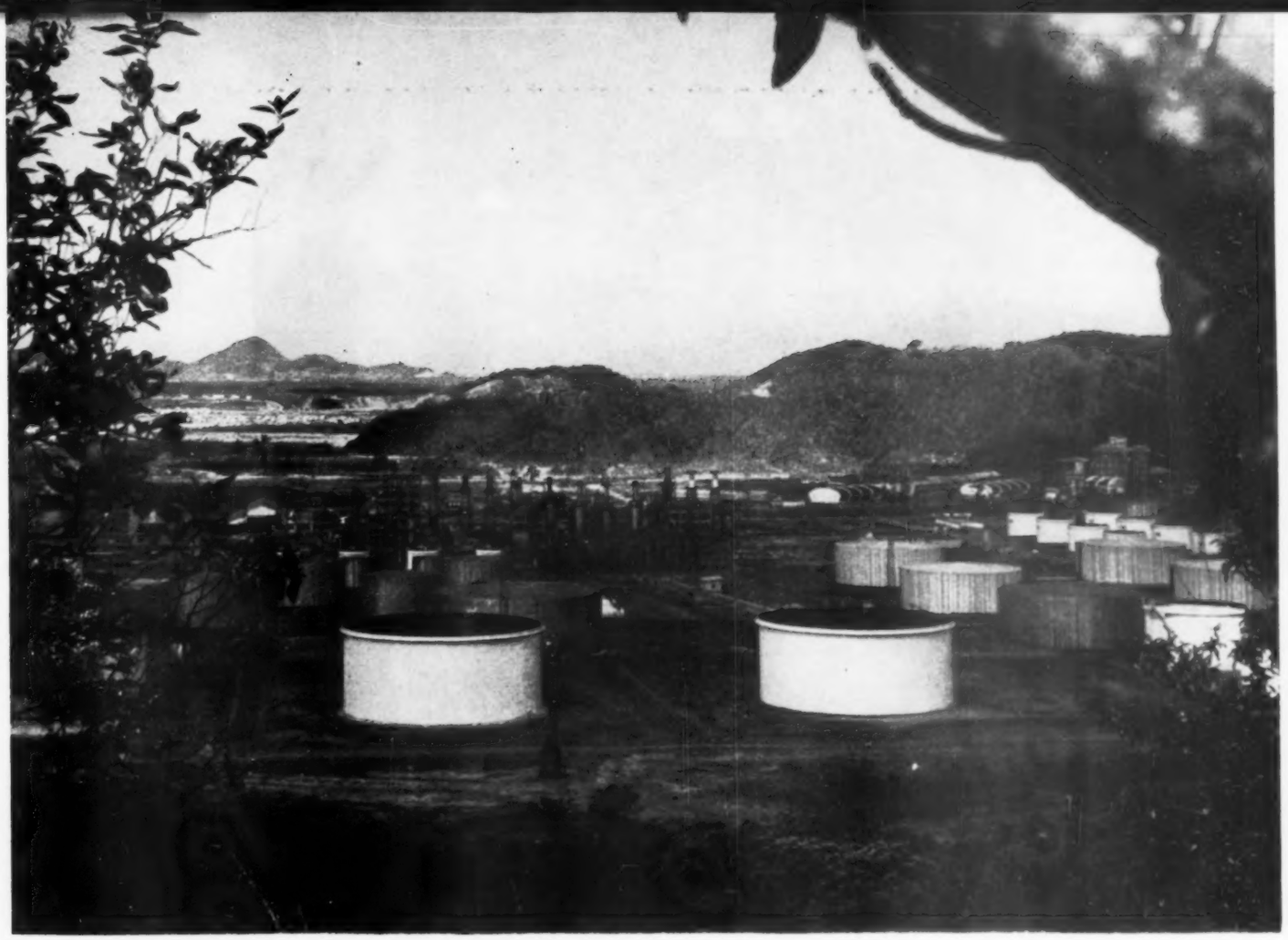


General view of Presidente Bernardes refinery at Cubatao, Sao Paulo state. Daily capacity of the plant is 70,000 b/d.

Brazilian exploration rises in 1957

At the end of 1957 about 54 rigs will be working for Petrobras. Over 3,000 persons are being employed in the Amazon region alone in the search for oil. Despite these efforts results so far have been disappointing, but the search goes on.

by R. G. Walker

INCREASED financial resources and technical assistance and more adequate supplies enabled Petrobras to step up exploratory work in 1957. The oil monopoly's budget provides for a total investment of 7,000 million cruzeiros (US $140,000,000) this year, of which 2,700 million, or 300 million less than the amount invested in 1956 in all sectors, was reserved for exploration and production. Two hundred specialists—Brazilians, Americans, Germans, French, and Austrians—are aiding in the search for oil; and 15 geological, 15 seismograph, and 8 gravimetric teams—38 in all—are operating, as compared with 29 in 1956. The number of rigs running was raised from 28 in September 1956 to 41 in May last, and 54 should be in service at the end of the year. A considerable volume of other equipment is now being landed in Brazil almost monthly, and Colonel Nunes, president of Petrobras, says he has ample funds this year to acquire all the material and personnel he needs.

Petrobras accounted for about 231,000 ft of hole drilled during 1956, up 30% over 1955. Discovery rate was better in 1956, as 68% of the wells were producers, compared with 44% of the 1955 holes.

Status of oil and gas wells as of January 1, 1957 was that there were 328 oil producers, 34 gas producers, 131 dry holes, and 64 stratigraphic wells—for a total of 557. During 1956, there were 32 oil producers, 14 dry holes, and one stratigraphic well.

Petrobras in 1956 organized 14 new geological field parties—for a total of 29.

Prospecting extends westwards from Manaus, towards the Peruvian frontier, and

Well No. 3—AZ at Nova Olinda in the Amazon Basin.

south to Santa Catarina and Rio Grande do Sul. During the first two months of 1957 Petrobras completed 20 wells, including 5 wildcats in new zones; 11 yielded oil, 1 gas, and 8 were dry. By June 30, wildcat drillings had reached 78,972 ft, development wells 87,886 ft this year, as against 44,609 ft and 76,983 ft in 1956.

The 1957 target aims at drilling 44 wildcats; viz., 11 in the Amazon Basin, 7 in Maranham, 5 in Sergipe-Amagoas, 18 in Bahia, and 3 in Parana-Sao Paulo. Also, 34 stratigraphic wells: 9 in Amazonia, 19 in Bahia, and 6 in Parana. According to the plan, wildcat drillings—including stratigraphic wells—should reach 441,155 ft this year; development wells, 276,250. In view of the above June figures, these targets will not be easily reached. For purposes of comparison, final results for 1956 were 95,991 ft and 134,829 ft, respectively. The exploration program, drawn up by Walter Link, provides for preliminary investigations in Rio Grande do Sul, prospecting and drilling in Amazonia, Maranham-Piaui, Rio Grande do Norte, Alagoas-Sergipe, Bahia, and Sao Paulo-Parana. The main objects are to discover new producing areas and determine the limits of known fields, increase production and verify reserves, which were estimated last year at 311,000,000 bbl. Although great hopes are entertained of finding oil in commercial quantities in the Amazon basin and Alagoas, the Bahia Reconcavo is at the moment the only productive area.

Production in 1956 in Bahia Reconcavo was as follows: gas, 83,877,536 cubic meters; oil, 4,058,703 bbl (11,197 b/d). By areas, oil output was:

	Barrels	*%*
Itaparicon	47,466	1.2
Candeias	1,520,497	37.4
Lobato	2,884	0.1
Dom Joao	644,838	15.9
Paramirin	18,637	0.5
Mata de Sao Joao	251,446	6.2
Agua Grande	1,569,865	38.6
Pojuca	3,070	0.1
Total	4,058,703	

As of January 1, 1957 daily average production per well in Bahia Reconcavo was 174.86 bbl. Applying this to 328 wells in the country, it might be assumed the country could produce 60,000 b/d.

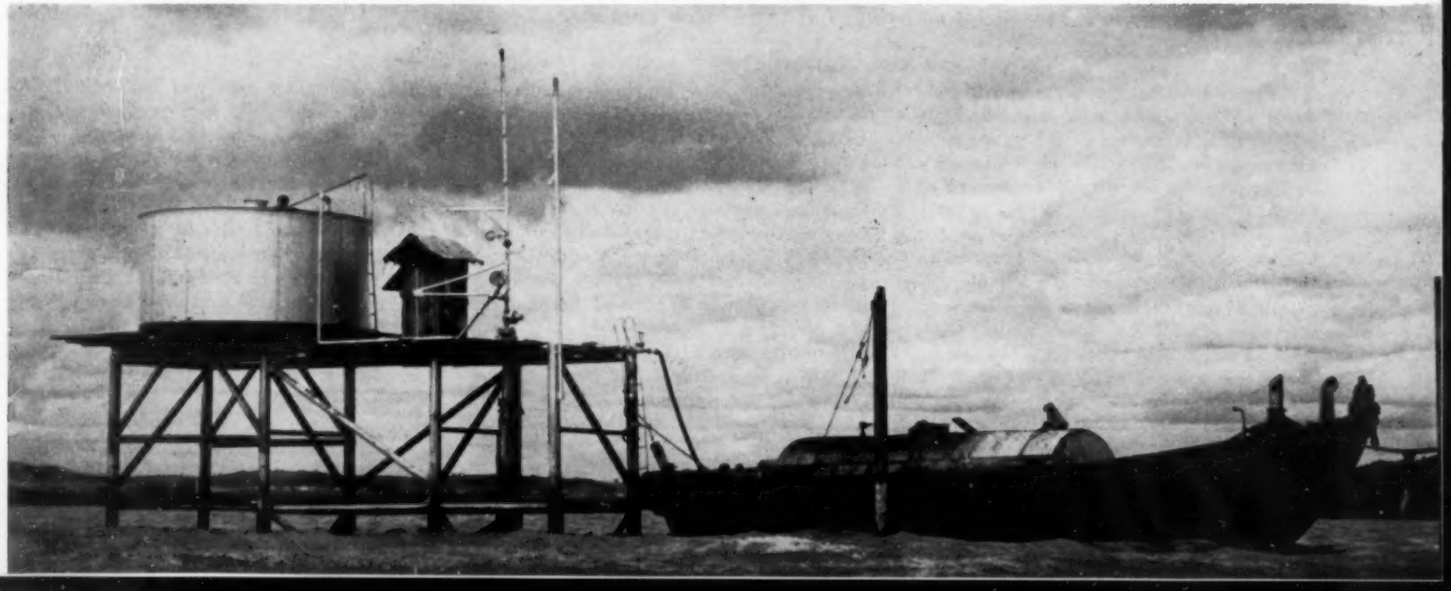
Exploration in Bahia Reconcavo: The following wells were drilling in January 1957: JA-1-BA, at Jacuipe; EP3 and EP5, deep structural; CC-1-Candeias Central. By March 30, 29 new locations had been marked for drilling, and 18 rigs were operating. In April and May, drilling was started at BP-1-BA, Jequia; SP-1-BA, Sao Pedro; EP6, deep structural; DJX-1-BA, in the Dom Joao field; and AG-ST-1-BA in that of Agua Grande.

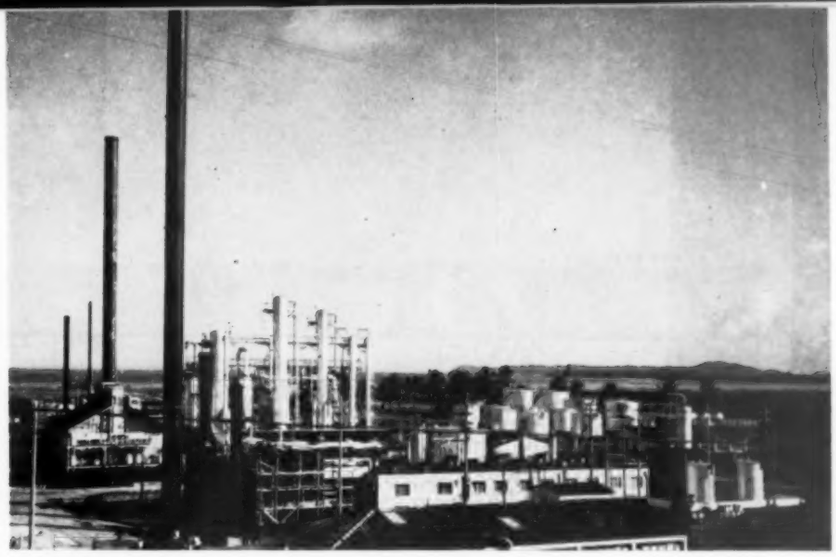
Comparing the first six months of 1956 and 1957, drillings to expand producing fields increased by 10,904 this year, to 87,886. The Dom Joao field, which was extended four miles offshore into the Bay of Todos Los Santos in 1955, was again expanded in August 1957, when DJX-1-BA was brought in as a producer at about 1,080 ft.

Of 31 offshore wells drilled in the bay since operations started there in October 1954, 26 are producing oil, the yield averaging 100 b/d per well. The oil, of paraffin base, is conveyed in tank lighters to the Madre de Deus ocean terminal and pumped from there to the Mataripe refinery for processing. An area of three square miles has been proved, with estimated recoverable reserves of 94,500,000 bbl. The Dom Joao field is believed to extend for several miles to the south, and 40 new locations have been marked for drilling in this direction. Lighters have been ordered to carry 1,000 bbl, twice the capacity of those now running; and the ocean terminal and pipeline installations are being amplified to handle 60,000 b/d.

The Amazon Basin, covering 579,000 square miles, or 42.85% of the area occupied by Brazil's 10 sedimentary basins, was

Offshore producing well, in Bahia de Todos Os Santos, Bahia state. Beside it is a tanker which transports production to land storage tanks.





View of the Mataripe refinery in Bahia state. It is now being enlarged to process 37,000 b/d.

the scene of the greatest activity in 1957. Four groups, two consisting of Brazilians, directly under Petrobras, and two of overseas specialists employed by contracted companies, are operating in this region, where 3,000 men—including locally-engaged laborers—are occupied in prospecting and drilling operations. Six geological, three gravimetric, and eight seismograph teams are busy in Amazonas ans Para. Prospecting was extended to the Negro, Tapajos, and Madeira Rivers early in the year and; in, September, to the Solimoes, Purus, and Jurua, affluents of the upper Amazon. Nine rigs were running in July, and preparations were then being made to install seven others.

The following wildcats were drilling in Amazonia early this year: Uraria, 85 miles by river from Nova Olinda; CP-ST-1-PA (Cupari), at the junction of the Cupari and Tapajos Rivers; No-2-AZ, on Marica Island in the Nova Olinda area, 0.54 miles from No-1-AZ, where oil was first found in the Amazon basin in March 1955; No-3-AZ, Nova Olinda, 2.5 miles from No-2-AZ; RX-1-AZ, at the mouth of the Abacaxis River; TR-1-AZ, on Trindade Island.

Four other wildcats were started this year; viz., No-4-AZ, on Marica Island; GU-ST-PA, at Gurupa, 190 miles west of Belem, Para; TA-1-PA, at Tapaiuna in Para, on the right bank of the Tapajos River, 60 miles from Santarem; MN-ST-1-AZ, in the municipality of Manaus, 13.8 miles by road from Itacoatira. Two more rigs are being installed in the Nova Olinda area this year, and several locations are being marked for drilling.

Oil and gas shows were obtained in February from NO-2-AZ at 8,898 ft. Drilling was continued to 9,155 ft; and production tests, started April 27, had yielded 1,450 bbl, under diminishing pressure, with heavy gas discharge, by May 26. Production then dropped below 10 b/d, owing to an accumulation of paraffin in the tube. A portable cleaning drill was installed, and a 90-day test will be started after removal of the paraffin and further drilling in order to determine if commercial production can be maintained.

In May, drilling was resumed at NO-1-AZ, which was shut down in 1955, pending arrival of a depth pump.

By June 30, wildcat drilling had gone to 27,798 ft this year, or 15,005 ft more than at the same date in 1956; and improved techniques had reduced the cost of drilling in this difficult region to 12,000 cruzeiros per meter, from 24,000 in 1954.

Exploratory Work in Other Areas: Three wildcats were drilling at the beginning of 1957; i.e., two in Maranham, TB-1-MA at Testa Branca and MO-1-MA, Mocambo, and one in Parana, CA-1-PR at Candido de Abreu. The last-named was abandoned in March at 9,074 ft, and is the third unsuccessful deep test of this basin.

By March 31, Petrobras had started drilling three new wildcats: JU-1-MA at Jerusalem in Maranham; TM-1-AL, at Taboleiro dos Martins, and JA-1-AL on the Jequia River, both in Alagoas, a new area. Seven wells were drilled in this state between 1939 and 1942 by the Petroleum Council, at that time responsible for oil activities and severely hampered by lack of materials, financial resources, and technical assistance. All proved dry at the maximum depths reached by the rigs then in use—except one at Ponte Verde, which yielded 15 b/d under pumping.

Oil and gas shows were obtained in August at 7,208 ft from JA-1-AL, 24 miles southwest of Maceio. A test was started on August 17, pressure increasing from average to very strong in 11 min, through a ¼-in. bore. Yellow-greenish oil, with a specific gravity of 0.8208 (corresponding to 41 API), flowed at an estimated rate of 35 bbl per hour during a 68-min test. Production tests will be carried out after lining and completing the well.

Drilling was resumed in September at TM-1-AL, where an accident interrupted work in August at 9,032 ft.

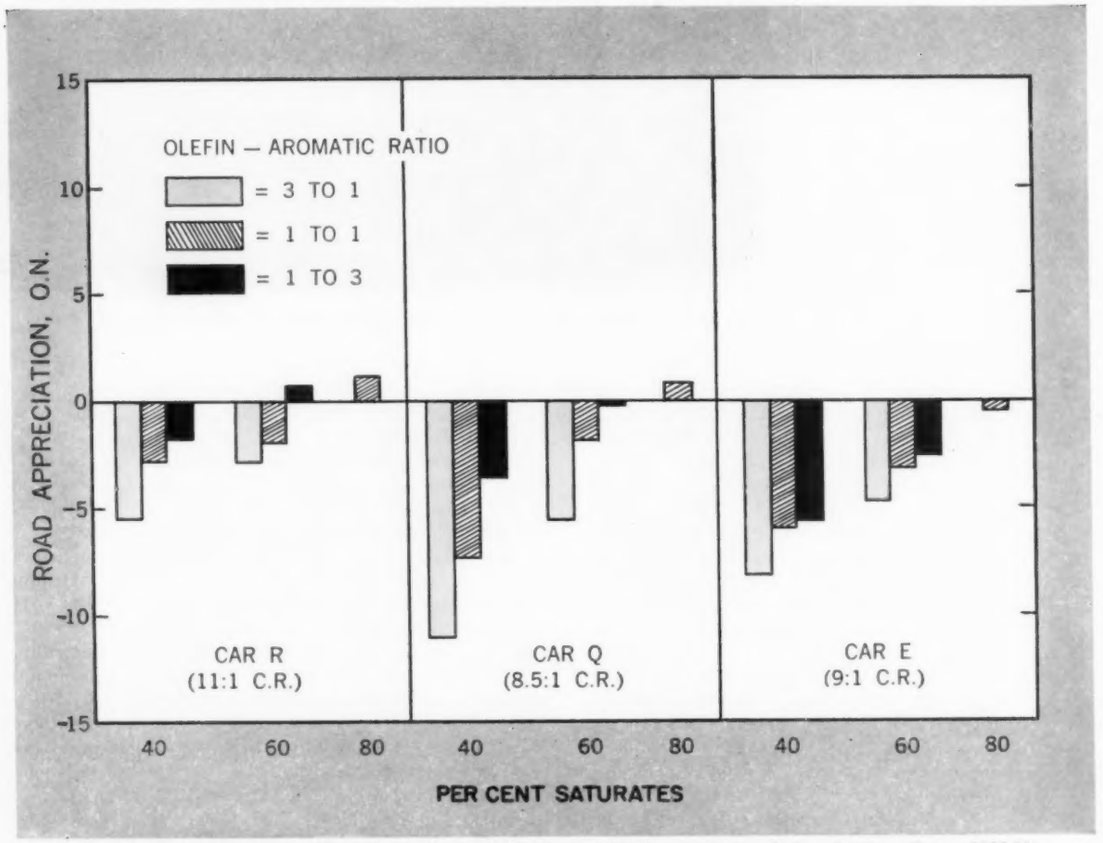
Drilling in Maranham was suspended in June at JU-1-MA at 4,450 ft; and, in July, at MO-1-MA for relining at 12,174 ft. Rigs then started operating at JU-2-MA, three miles from JU-1-MA, and at MD-1-MA in Mirador, and a third was installed at Curva Grande, municipality of Santa Helena in Maranham, for more detailed investigation of the Jerusalem structure.

Two gravimetric and one seismograph team are operating in Maranham, studying drilling sites on the northeastern coast, in the Dom Pedro municipality and in the Mangabeira and Sambaiba areas in the west, where structural conditions are similar to those at Testa Branca.

By June 30, two other wildcats were drilling; viz., RC-1-PR at Rio Claro, in Parana, and PE-ST-1-SP at Presidente Epitacio, in Sao Paulo. In August, investigations were extended to Marcelino Ramos, in Parana, and in Piraciaba, in Sao Paulo, to determine the location of other wildcats in those states.

BRAZILIAN WILDCAT DRILLING
(July 27, 1957)

Well	Depth (feet)	Well	Depth (feet)
Amazon Basin:		Bahia Reconcavo South:	
NO-3-AZ (Nova Olinda)	11,264		
TR-1-AZ (Trindade)	9,854	CC-1 (Candeias Central)	8,092
Uraria	7,189	SP-1-BA (Sao Pedro)	3,019
TA-1-PA (Tapaiuna)	3,490	DJX-1-BA (Dom Joao)	1,079
NO-4-AZ (Nova Olinda)	4,066	BP-1-BA (Boipeda)	6,458
GU-ST-PA (Gurupa)	6,207	AG-ST-1-BA (Agua Grande)	1,800
MN-ST-1-AZ (Manaus)	2,512		
Maranham:		Parana:	
MD-1-MA (Mirador)	2,577		
		RC-1-PR (Rio Claro)	5,795
Alagoas:		Sao Paulo:	
TM-1-AL (Taboleiro dos Martins)	9,031		
JA-1-AL (Jequia)	7,208	PE-ST-1-SP (Presidente Epitacio)	4,287



Effect of hydrocarbon-type concentration on the road appreciation of leaded blends containing three hydrocarbon-types. Tests at 3000 RPM were made in two 1955 cars of conventional engine compression ratio and in one experimental model of 11-to-1 compression ratio

Ethyl Research Offers Refiners New Benchmark in Rating Gasoline Test Blends

Road Performance Predicted From Laboratory Data

BY F. D. BUERSTETTA, Refinery Technology Division, Ethyl Corporation Research Laboratories

A CONTINUING research program in Ethyl Corporation's Detroit Laboratories has produced new data that will assist refiners in blending their fuels for optimum road performance.

These data are available in a published report entitled, "Road Performance of Ternary C_7-C_8 Hydrocarbon Blends." It is the fifth in a series of progress reports on the program which is aimed at gaining a more thorough understanding of the principles relating gasoline hydrocarbon composition to road antiknock performance.

In this latest report, consideration of the effects of hydrocarbon-type concentration in various blends containing three hydrocarbon types in the C_7-C_8 range at two tetraethyllead concentrations forms the basis for discussion.

Binary Blend Testing Preceded Ternary Blend Studies

All four previous reports were based on the road antiknock behavior of 99 blends, each of which contained two types of pure hydrocarbons in the C_7-C_8 range.

These blends, composed of toluene and diisobutylene separately added to mixtures of isooctane and n-heptane, were extensively tested to find the relationships that exist between road performance and the fuel variables commonly defined by laboratory tests:

Hydrocarbon type and concentration, Research and Motor octane number, and TEL concentration.

An Ethyl Corporation Research team evaluates data obtained in the most recent study of the relationship of fuel variables to road performance.

The program's scope included numerous combinations of hydrocarbon concentration and TEL content at the Research octane levels of 92, 96 and 100, thus permitting several different approaches to the data analysis.

Blends considered in this most recent phase of the program also were of toluene and diisobutylene, representing aromatics and olefins respectively in saturate mixtures of isooctane and n-heptane.

These components were combined to give ternary blends containing 40, 60 and 80% saturate concentration with olefin-to-aromatic ratios of 1-to-3, 1-to-1, and 3-to-1 at each saturate level.

A nominal Research octane number level of 100 was maintained for all blends at TEL concentrations of 0.0 and 3.0 ml per gallon.

In order to provide comparisons with the binary blend studies, road ratings were conducted in the same 1955 passenger cars that were used in previous tests, (nominal compression ratios of 9.0-to-1 and 8.5-to-1).

The blends also were rated in a car having an 11-to-1 compression ratio engine to permit evaluation of performance in engines of the future. All data were interpreted in terms of "road appreciation" to give refiners a better idea of the effectiveness of each blend.

New Tests Confirm Earlier Conclusions

Test results of blends containing three hydrocarbon-types verified the previous conclusions based on binary blend studies — that hydrocarbon-type and concentration, Research and Motor octane number, and TEL level are the most important factors affecting the road performance of gasoline.

Analyses of test data produced these conclusions:

1. The addition of TEL from 0.0 to 3.0 ml per gallon significantly increased road appreciation in all cars over the speed range. This effect is greatest at high engine speed.

2. TEL generally has the greatest effects in fuels containing highest aromatic and saturate percentages.

3. Increasing aromatic content at constant saturate level results in increased road performance of the ternary blends in all cars.

4. With regard to road appreciation, the ternary blends vary—as did the binary blends—according to changing aromatic (or olefin) percentages.

5. Road appreciation is also related qualitatively to fuel sensitivity.

6. The hydrocarbon-type effect is most notable at high engine speeds in all of the test cars.

Results of the long-range program are made available to the refiner as the data are analyzed and reported.

Over-all Research Program Continues

These research findings are but another step forward in Ethyl's continuing effort to aid the refiner in blending fuels and predicting road performance without extensive road testing.

Right now, the long-range program is being carried forward to include all of the hydrocarbons falling within the gasoline boiling range. The results obtained in this important phase of the program will be made available for study by refiners in the near future.

How Ethyl Research is helping you

At today's high octane levels, the art of blending hydrocarbons has taken on ever-increasing importance. As a service to the Petroleum Industry, Ethyl Research launched its long-range hydrocarbon blending program in 1956 to complement the intensive Industry effort being devoted to the problem.

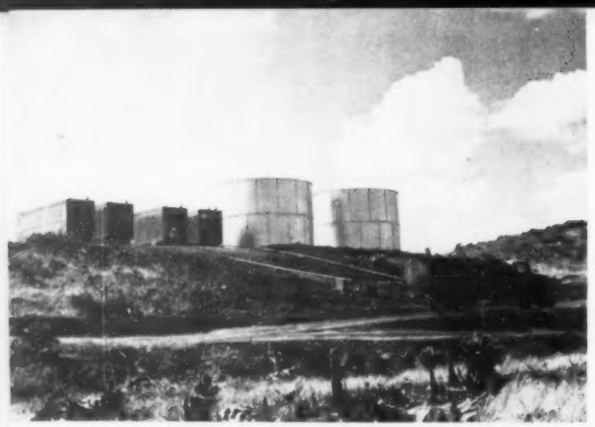
Since the program started, Ethyl has made available four technical reports: "Octane Possibilities with C_7-C_8 Hydrocarbons," "Octanes That Count," "TEL, Hydrocarbons and Road Appreciation," and "Road Performance of C_7-C_8 Blends via Computer Analysis."

Now a fifth report, "Road Performance of Ternary C_7-C_8 Hydrocarbon Blends," is available for your study. Copies of this—and any of the previously issued reports—can be obtained from your Ethyl Representative or by writing Ethyl Corporation, 100 Park Avenue, New York 17, N. Y.

ETHYL CORPORATION
New York 17, N. Y.

ETHYL ANTIKNOCK COMPOUND — ETHYL CORPORATION

RESEARCH LABORATORIES:
1600 W. Eight Mile Road, Ferndale 20, Mich.
2600 Cajon Road, San Bernardino, Calif.



Tank truck loading from storage tanks in Bacuranao-Cruz Verde field.

Crisis in Cuba

The bloom is gone from the Cuban oil boom, and exploration is in a crucial stage. Leases have gravitated from the hands of independents into the hands of the larger companies, who are seriously evaluating the island. For the first time in Cuban history several deep tests will be drilling simultaneously during 1958. This presumes, of course, that the legal question of State reserves is adequately solved by the government and not permitted to delay operations as it did during 1957.

by Earl Copeland, Jr.
Associate Editor, Cuba Petroleum News Digest

Cruz Verde No. 1, discovery well of Cruz Verde field, on pump.

A Bucyrus-Erie 36L cable-tool rig drilling Consolidated No. 6 in Bacuranao-Cruz Verde field.

SURFACE oil seeps have been known in Cuba since the discovery of the island. Bacuranao shallow serpentine oil field in Havana province was discovered in 1864; Motembo shallow serpentine naphtha field in Las Villas province was discovered in 1880; Jarahueca shallow serpentine oil field in Las Villas province was discovered in 1943. In 1935 the combined production of Motembo and Bacuranao rose above 75,000 bbl per year for the first time. In 1943, production of the three fields exceeded 150,000 bbl per year. In 1946, it reached 250,000 bbl per year, and then fell to less than 50,000 bbl per year in 1951.

In 1938 the basic Mineral Fuel Law replaced cumbersome legislation, and four major companies became interested in Cuba. Atlantic drilled 8 holes from 1939 to 1941; Shell-Mex drilled 12 holes from 1939 to 1947; Esso Standard Oil (NJN) drilled 10 holes from 1944 to 1948; Gulf drilled 2 holes from 1949 to 1951, and carried out a core-drilling program from 1953 to 1954. These 32 holes were all left dry and abandoned. Interest in Cuban oil languished. The majors gave up many of their concessions; and only a few independents, mostly land companies, showed any signs of interest in Cuba's oil future.

In early 1954 there were three rotary oil rigs in Cuba: one a small core drill used by Gulf; another stripped and abandoned in Jarahueca field; the third a National 75 rotary which had just spudded in Echevarria No. 1 well near the town of Jatibonico, Camaguey province, central Cuba. The last rig had been purchased in 1952 by the National Development Commission of Cuba, and until wildcatter Dr. Antonio Iglesias started drilling Echevarria No. 1, this rig had been inactive. On May 1, 1954 the well came in at about 200 b/d flush production from 1,072 ft. Cuba had its fourth shallow oil field. The crude was 14.7 gravity, and its practical use limited to serving as fuel oil. The present surge of oil interest actually dates from May 1, 1954, when heavy oil flowed from this discovery well. The Jatibonico discovery resulted in focussing the attention of the oil world once more on Cuba, and it had a psychological effect on the Cuban picture in excess of its basic merits. A moderate oil boom got underway. It was aided by the government which issued Law-Decree 1526 in July 1954, the first comprehensive change in the basic Mineral Fuel Law of 1938. This legislation, to be effective for a five-year period, specified that any group or individual prepared to spend a minimum of a million dollars in exploration could obtain exploration loans from the government for amounts up to two-thirds of the operator's available capital. The government receives no participation; but, if oil is found, the loan, plus 6% interest and a 10% bonus, is repaid out of 20% of the oil. Also, during the repayment of the loan, the operator pays a special royalty for the Public Works Program, which runs from 2.5% on 1,000 bbl monthly production to 0.25% on a monthly production of 50,000 bbl.

Pertinent legislation includes:

1. Mineral Fuel Law—May 9, 1938.
2. Regulations for the Mineral Fuel Law (Presidential Decree No. 2625—October 16, 1939).
3. Petroleum Mining Stimulation Law (Law-Decree No. 1526 July 8, 1954).

Refining operations were encouraged by Law-Decree No. 1758 of November 2, 1954, which granted special benefits to refineries. Regulations for the administration of Law-Decree No. 1758 of 1954 (Presidential Decree No. 3862) were issued on November 30, 1955. The laws grant substantial tariff and duty exemption for a period of 20 years both to new refinery projects and to enlargements of existing plants. It further provides that no additional taxes will be levied during the 20-year period, and offers new refineries many of the advantages accorded new industries. The law-decree permits interest paid on loans for construction to be deducted before profit taxes are paid,

and protects the price structure in many ways.

Cuba's economic index has always been geared closely to its sugar crop and the world sugar price. Its sugar crops, in the face of chronic overproduction, have been limited in recent years with resultant smaller yields and less national income from its best source. The country, therefore, was, and is, endeavoring—through governmental organizations, legislation, research, and every other conceivable means—to reduce its degree of dependence upon sugar. The possibility of commercial oil in Cuba, therefore, tended, and still tends, to receive favored attention.

Cuba has no coal, and only one electrification project, begun a few years ago, to furnish energy. Oil is the basic fuel in Cuba, and the economy is still undeveloped industrially. Finding commercial production would provide a basic source of energy so needed for large-scale industrialization.

The country is economically stable, with a peso freely convertible into dollars. The government is carrying out extensive public-work projects, and construction is at a high level. Cuba appears to have entered on a period of economic normal stability favorable to all types of investment. The improved position of the world sugar market in the past two years has been an added factor in improving the economic outlook.

The economy continued to expand during 1956-57, with the industrialization and diversification program of the present government bringing many new industries to the island. The building of secondary and farm-to-market roads increased transportation facilities. Good sugar sales and high income from customs duties have left the country's economy in a very favorable condition. Continued political attacks on the present government have had only a limited effect on the economic life of the country.

Drilling and exploration in 1955 centered on the known fields and contiguous areas. In 1956 wildcatting increased considerably, and still greater emphasis has been placed on wildcatting in 1957.

There are no gas wells in Cuba. No pipelines are in existence—although a firm called Cuban Gas Transmission Co., headed by California oil man Edwin Pauley, recently announced it hoped to pipe natural gas 1,600 km from Mexico to Havana by an undersea gas pipeline. The plan envisages a submarine pipeline from the Campeche natural-gas fields in Mexico to run along the sea bottom between the Yucatan peninsula and Cuba and through 240 km of Cuban soil into Havana, from which it would be continued underseas into Florida. If carried out, the project would bring natural gas a low cost to areas now either inadequately or over expensively serviced—thus contributing to Cuban industrialization.

A study made by Cuba Petroleum News Digest on estimated expenditures and commitments for exploration and drilling in Cuba for the years 1952 to 1956 shows that actual expenditures were about $250,000 in 1952, $500,000 in 1953, $750,000 in 1954, $3 million in 1955, and $12 million in 1956. Drilling commitments and exploration obligations were estimated at $500,000 in 1952, $750,000 in 1953, $3 million in 1954, $15 million in 1955, and $40 million in 1956. It must, of course, be remembered that these commitments may be considerably increased or diminished in accordance with any changes in interest in Cuba. 1956 saw the consolidation of most Cuban acreage into the hands of a relatively small number of large companies. It seems probable that there will be an increase both in funds committed for expenditures and commitments for exploration in 1957. It is not as yet possible to state how much of these extra funds will go into drilling.

The oil business has settled down to a sedate pace in 1957: Many of the independents are gone, and with them has gone the flush of success which pervaded the country in 1954.

It seems probable that the search for oil in Cuba will continue without much let up for two or three years due to the present commitments. Any new strike or a good deep discovery during that time should set off a renewal of the boom, for which Cuba is now fully prepared.

On the positive side, Trans-Cuba Oil Co. has established the existence of a large Tertiary basin in Camaguey province. Although the basin limits have not yet been defined, it appears likely that sections of 6,000 ft to 11,000 ft cover large areas.

Cuban Kewanee Oil Co. has demonstrated the existence of a salt formation in northern Camaguey province. Although many geologists do not believe that the existence of a salt dome has been established, there is no doubt a salt formation of some nature exists; it is the first located in Cuba.

Cuban American Drilling & Exploration Co., a subsidiary of Cuban American Oil Co., has produced clean, pipeline oil of 32 gravity from a new area, the Catalina field in Camaguey province. United Cuban Oil Inc. has produced oil from 6,000 ft in Santa Maria del Mar field, but this serpentine production does not have the same significance as deep sedimentary production, the first in Cuban history. Clarence W. Moore, president of Consolidated Cuban Petroleum Corp., recently stated: "An ever-increasing number of the more attractive leases have gone back into the hands of the majors. This is a healthy sign if the majors carry through with drilling programs. It is not a good portent if they simply hold the leases as they concentrate on bigger problems and already-established fields in more troubled parts of the world . . .

"Field studies and seismographic work demonstrated that areas exist where there may be oil, and oil companies hate to walk away from an area with such characteristics. They certainly are not prone to give up leases in a country where their competitors retain leases and plan to drill deep tests.

"So Cuba is beginning a new stage of its drama in the search for oil: the second drive of the majors. The first incomplete period fizzled out in the late 30's and disappeared in the face of World War II. What does this presage for Cuba? It means that, for the first time in the island's history, several major companies will be simultaneously drilling deep tests on locations chosen after extensive field work, and from information learned from the more than 700,000 ft of hole that has been drilled since that 1954 May Day.

"The list of majors toeing the mark in Cuba is impressive. Atlantic Refining, which never gave up some of its leases in Pina del Rio province at the western end of Cuba, plans a series of eight test wells, at least four of which will be deep holes. Texas Co. has apparently finalized its agreement with Gulf which will result in four deep test wildcats in Las Villas province in central Cuba. Stanolind has finished its island off the south coast of Las Villas for a projected deep test. Shell, in the presence of newly arrived USA Ambassador Earl E. T. Smith, spudded a deep test off the north coast, near where they drilled over 10 years ago. Partners with Shell in the venture are Standard of New Jersey and Atlantic Refining. Standard of California has had field

TABLE I

CUBAN OIL FIELDS

Location	Type	Structure	Date of Discovery
Bacuranao Havana Province	Oil	Shallow serpentine	1864
Motembo Las Villas Province	Naphtha	Shallow serpentine	1880
Jarahueca Las Villas Province	Oil	Shallow serpentine	1943
Jatibonica Camaguey Province	Oil	Shallow sedimentary	May 1, 1954
Cruz Verde† Havana Province	Oil	Shallow serpentine	Jan. 21, 1955
Santa Maria del Mar Havana Province	Oil	Shallow and deep serpentine	March 3, 1955
Catalina field Camaguey Province	Oil	Deep sedimentary	July 12, 1956
Guanabo field Havana Province	Oil	Shallow sedimentary	May 19, 1956

†Some geologists consider this field an extension of the old Bacuranao field. The two are often placed together as Bacuranao-Cruz Verde field.

parties working off the north coast; and Kewanee, a strong independent, has started a deep wildcat on a Gulf farmout . . . "on the negative side, it is true that exploration during the past three years has not produced any great discoveries. Some wells have been disappointing, the most recent case being the Siboney well, projected to 10,000 ft but abandoned above 2,000 ft when an unfavorable formation was encountered. These failures have been offset by a series of positive findings that have caught the eye of the entire oil industry. Production meanwhile has risen from almost zero to more than 1,000 bbl daily, and highly provocative geological data is discovered daily . . .

"One of the hardest blows was a tangent that landed in Venezuela. Last year the government of the oil-rich country freed long-held leases in the Maracaibo Lake area, and majors promptly paid out more than $330,000,000 for lease rights alone. Add to this the terrific amount required to exploit the new expensive holdings, and it is easy to imagine how Latin American budgets had to be shaken up. That development caused a hiatus in operations in Cuba that was generally unrecognized, and only recently has Cuba been able to more or less free itself from the devastating effects of this Venezuelan move . . .

"Cuba, then, is at its crossroads. Interest will remain in Cuba, and the present deep tests that are planned for 1958 and 1959 deserve . . . serious attention . . . They could portend a rapid expansion of . . . interest in Cuban oil, and any one of several wells now spudded or marked on the majors' maps could be the key. Cuba and its maturing oil enthusiasts find themselves with three years of high hopes and hundreds of thousands of feet of test hole to look forward to."

Cuba's refining capacity has also changed almost overnight. A year ago there were two refineries in operation, the 2,000 b/d Refineria Cabaiguan and the 9,400 b/d Esso Belot refinery. Shell has built and put onstream a 28,500 b/d plant on Havana Bay; The Texas Co. (West Indies) Ltd. is completing test runs on a 20,000 b/d plant at Santiago de Cuba; Esso Standard Oil expects to have its Belot refinery expanded to 35,000 b/d by the end of 1957. By mid-1958, Cuba will be refining 85,500 bbl of oil a day. Cuba consumes from 55,000 bbl to 60,000 bbl of petroleum products daily, and consumption is increasing at double the rate in the United States as the island's industrialization proceeds apace. Should large-scale commercial oil be found in Cuba, the refineries are ready. Now they must import the crude on which to operate.

Russell Cobb, Jr., of Western Hemisphere Petroleum Corp., has noted an important and often overlooked fact: "It is a widespread feeling among independent oil men that you are apt to find reserves in Canada, the Caribbean islands, and the countries of Central and South America. I think this is evident because of the large number that are forming syndicates to do this type of exploration."

The difficulty of finding sizable leases in the USA; the increased cost of leasing, exploration, and drilling; and the diminishing success in finding commercial production are leading many American companies to look abroad.

Disturbances in the Middle East, the closing of the Suez Canal, and the increasing demand for oil all over the world have been a potent and ever-increasing factor in encouraging exploration throughout the Western Hemisphere. These and other factors all exercise a strong and growing influence on Cuban oil exploration. They are but slowly felt; their influence is nonetheless great.

The principal reason for a decrease in some type of oil activity in Cuba in 1957 is due to the failure of the government to issue legislation clarifying certain points in the existing oil laws. A principal source of confusion is the argument over the wording of Decree No. 1526 of 1954. Sizable blocks of land had fallen into the State reserve; the decree released these areas so that they could be granted to applicants. The confused wording of the decree left it debatable as to what date these reserves were freed. Those who interpret the decree to mean the State reserves were freed on July 29 applied for concessions on most of the available areas; those who consider that a later modification resulted in releasing State reserves on August 15 applied for other concessions on the same areas. Each side thinks it is right; but, if all the claims and counterclaims must be fought through the courts, few people will have the time, money, and inclination to do so. Both sides want a clarification. The government has only to state that one date or the other is correct and the matter is settled.

Failure to do so to date has resulted in slowing down of activity at its most crucial moment. The geologists, the rigs, the geophysical crews are in Cuba now. Companies have studied the island, are interested, and have funds ready to spend. They are not spending money on areas to which they do not have—and cannot now get—clear title. Meanwhile, interest is growing in Panama, Costa Rica, Honduras, Guatemala, and other areas in the Caribbean and in Central America.

Cuba cannot run the risk of losing its hard-won place in the oil picture by default. The law must be clarified.

Refinery processing averaged: 9,000 b/d in 1954; 10,000 b/d in 1955; 11,400 b/d in 1956; 40,200 b/d in 1957 (to July 1).

Rotary oil rigs in Cuba totaled:

3 in 1953	16 in 1956
8 in 1954	18 in 1957
14 in 1955	

Well drilling totaled: *12 on Dec. 31, 1954; *11 on Dec. 31, 1955; *16 on Dec. 31, 1956; 11 on July 1, 1957.

Geophysical activity (including seismograph, magnetometer, and gravimeter) totaled 28 crew-months in 1954; 35 in 1955; 80½ in 1956; and 27½ crew-months in the first six months of 1957.

Cuban production totaled 57,163 bbl in 1954; 381,824 bbl in 1955; 543,121 in 1956; and 193,160 bbl in the first six months of 1957.

Footage drilled totaled (core drilling not included): 80,000 ft in 1954; 249,831 ft in 1955; 278,515 ft in 1956; 103,864 ft in 1957 (first six months).

** Does not include wells shut down for Christmas holidays.*

TABLE II

CONSUMPTION PETROLEUM PRODUCTS IN CUBA
(1,000's of 42 gal. bbls.)

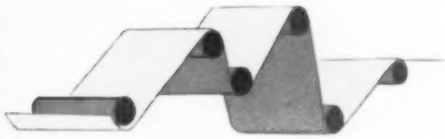
	Aviation	MOTOR FUEL (1)			Kerosine		Residual				
1951	Gasoline	Pure Gasoline	Alcohol	TOTAL	Tractorine	Diesel Fuel	Fuel	Lube Oils	Greases	Asphalt	GRAND TOTAL
Imported Product	210	2,900	—	2,900	20	715	8,350	185	20	35	12,435
Locally Refined	—	770	425	1,195	560	510	505(2)	—	—	265	3,035
Total Consumption	210	3,670	425	4,095	580	1,225	8,855	185	20	300	15,470
1952											
Imported Product	200	3,125	—	3,125	—	775	9,450	175	20	20	13,765
Locally Refined	—	825	550	1,375	630	685	380(2)	—	—	320	3,390
Total Consumption	200	3,950	550	4,500	630	1,460	9,830	175	20	340	17,155
1953											
Imported Product	205	3,125	—	3,125	—	815	9,665	155	15	2	13,982
Locally Refined	—	875	825	1,700	680	800	350(2)	—	—	243	3,773
Total Consumption	205	4,000	825	4,825	680	1,615	10,015	155	15	245	17,755
1954											
Imported Product	220	3,330	—	3,330	—	1,030	9,800	190	20	2	14,592
Locally Refined	—	870	915	1,785	755	945	430(2)	—	—	268	4,183
Total Consumption	220	4,200	915	5,115	755	1,975	10,230	190	20	270	18,775

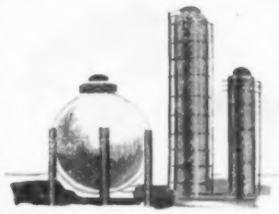
(1)Motor Fuel is a blend of Alcohol and Motor Gasoline. (2)Includes Residual Fuel used for fuel in refining.
Source: Trade Circles.

TABLE III

CUBAN OIL CONSUMPTION

	Aviation	MOTOR FUEL (1)			Kerosine		Residual				
1955	Gasoline	Pure Gasoline	Alcohol	TOTAL	Tractorine	Diesel Fuel	Fuel	Lube Oils	Greases	Asphalts	GRAND TOTAL
Imported Product	216.7	3709.0	—	3709.9	—	1245.7	9585.	193.6	21.2	2.8	14974.9
Locally Refined	Jet 2.6*	758.9	972.9	1731.8	869.3	1029.	457.8	—	0.3	287.6	4375.8
Total Consumption	216.7	4468.8	972.9	5441.7	869.3	2274.7	10042.8	193.6	21.5	290.4	19350.7





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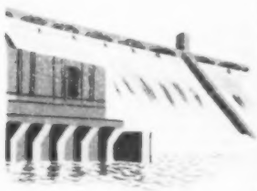

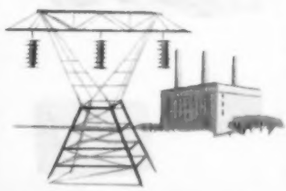

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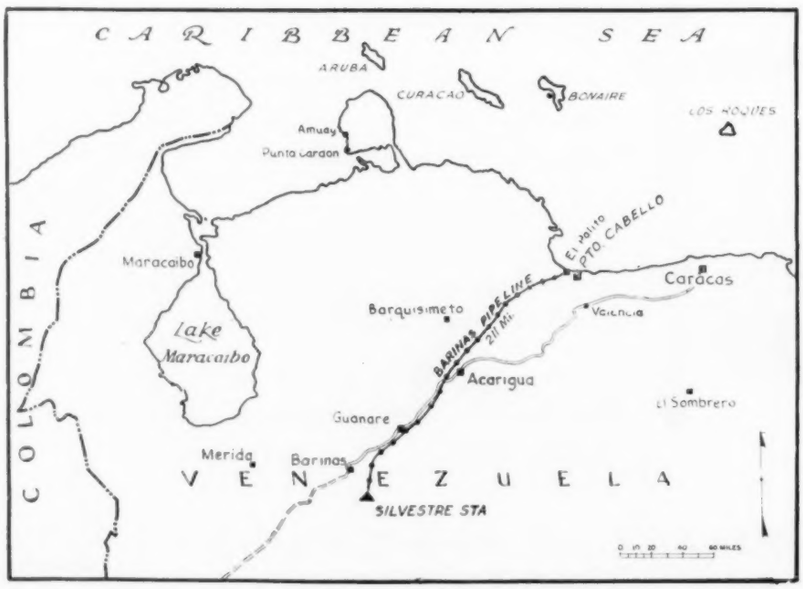
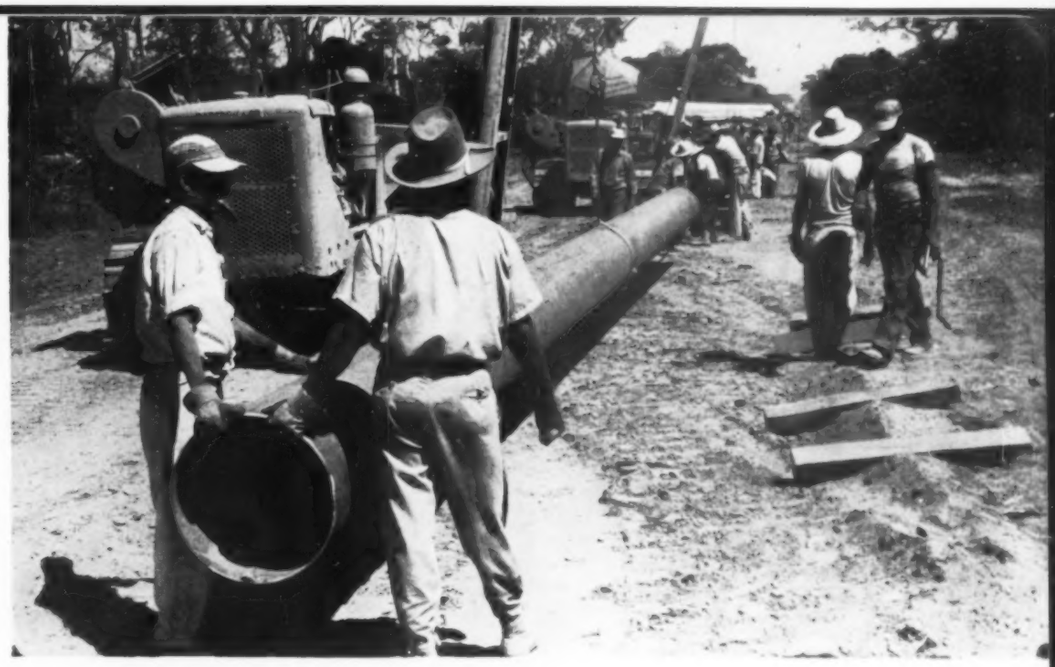
Bird's eye view of the El Palito terminal, Barinas line (photo, courtesy A. T. Pasche, Socony Mobil Oil Co.).

Major new pipeline complete in Venezuela

Work on the 100,000 b/d crude outlet for Barinas crude has been completed by Williams Bros., and the line will shortly deliver crude to the Caribbean for Socony and Sinclair companies. It opens a new producing area—Venezuela's most recent—and puts more pressure on the imports question.





Construction of the line is above ground most of the way. Venezuelan workers are shown working on one of the line's straight stretches. Generally, it is exceptionally direct—only 16 miles longer than the straight-line distance (photo, courtesy Socony Mobil Oil Co.).

THE 20-in. pipeline from Barinas to Puerto Cabello has been finished and will deliver oil to the Caribbean before the end of this year. Williams Bros. are constructors for the line, which was designed for a daily throughput of 100,000 barrels at a maximum operating pressure of around 1,200 psi. Its capacity can be boosted considerably, however, by additional pumping units. The maximum generally given is 150,000 barrels daily but recently a Sinclair spokesman described the line as capable of 300,000.

The specifications of the line have been previously described (World Petroleum, July 1, 1957). To recapitulate, its principal characteristics are: Pipe size, 20 in.; Pumping units (there are pumps only at the point of origin, San Silvestre field), three V-type 16 cylinder, turbocharged dual-fuel engine. They deliver to the pumps about 2,000 hp., using crude from the line as fuel. The pumps themselves are two-stage centrifugals. Tankage at the station consists of four 150,000 barrel tanks. At the other end of the line tankage consists of five tanks of 268,000 barrels each, located on a hill for a fast gravity feed.

From Silvestre the line follows the straightest possible route, some 201 miles to the Caribbean. The line is above ground, supported on 12 in. concrete blocks with a maximum spacing of 40 ft. Numerous river crossings called for suspension spans at the larger rivers and creeks, a total of 12 along the way. There are H-frame supports at smaller creeks and swampy ground.

The terminal is at El Palito (Little Branch), on the Caribbean 7 miles west of Puerto Cabello. A pier 1,800 ft long, with the last 450 feet swinging around to head due northeast, permits loading of two large tankers simultaneously at a maximum rate of about 30,000 barrels per hour. Provision is made for adding two more hoses per side (there are three 8-inch hoses now) of 10-inch diameter. A second loading line, in addition to the 30-inch line now installed, can be added if necessary.

The elevation of the tanks is about 265 feet for four of the big API floating-roof storage tanks and 247 for one. They have firewalls about 6 ft. high on three sides, with the west side left open to allow any spillage to run off against dams in the valley below—important safety features for this new Venezuelan installation. END

Left: Pipeliner from Williams Bros. spread attaches line from side boom. This is in a relatively level stretch of the Barinas-Puerto Cabello 100,000 b/d line (photo, courtesy Socony Mobil Oil Co.).

Right: Welder on the pipe gang: The spread is Williams Bros.', but much local labor is used. This line now is complete, and will be delivering crude to the El Palito terminal by the end of the year (photo, courtesy Socony Mobil Oil Co.).

Oil hits peak in Colombia

(Continued from page 41)

this area was the object of wildcat drilling by Shell and the then Tropical Oil Co. on concessions solicited by Colombian independents and transferred to the major operators.

At No. 14, Cities Service is drilling its Chucuri wildcat as a joint venture with Ecopetrol, the official Colombian oil enterprise, in the area known as the Carare region within the De Mares property. The Carare area covers 96,000 hectares, and title to the oil was the object of considerable litigation—after a most colorful legal and political history, during which time the title to the subsoil oil rights was contested. Ecopetrol made an agreement with Cities Service for a 25-75% operation, respectively, and equal interest not only in the Carare, but also in the 35 km surrounding the De Mares property. The National 130 rig used in this test has been leased from Ecopetrol. As may be seen, this wildcat location is some 6 miles south of Shell's 30,000 b/d field and just west of Ecopetrol's 28,000 b/d field.

Further upstream in the upper Magdalena valley, Intercol made a discovery at No. 17 with its Gualanday 3, which tested 850 b/d of 38 API oil. This area has been deep-tested jointly with Richmond in 1949, with two wells drilled to 6,904 ft and 2,198 ft. Gualanday No. 3 wildcast is classified as No. 68 in Intercol's oil exploratory program. The location is in a private oil property, but within a national concession.

TABLE 6 Current Landholdings in Colombia—October 1957

	Holder or Owner	Million Hectares	Million Acres
1.	Intercol	11.1	27.4
2.	Shell	3.8	9.4
3.	Texas	3.6	8.9
4.	Mobil	1.1	2.8
5.	Sun	0.5	1.2
6.	Richmond	2.4	5.9
7.	Cities Service	1.3	3.2
8.	Colpet	1.5	3.7
9.	Ecopetrol	0.9	2.2
10.	Independents	0.2	0.5
11.	E. Ospina-Racines	0.4	1.0
	Total	26.8	66.2

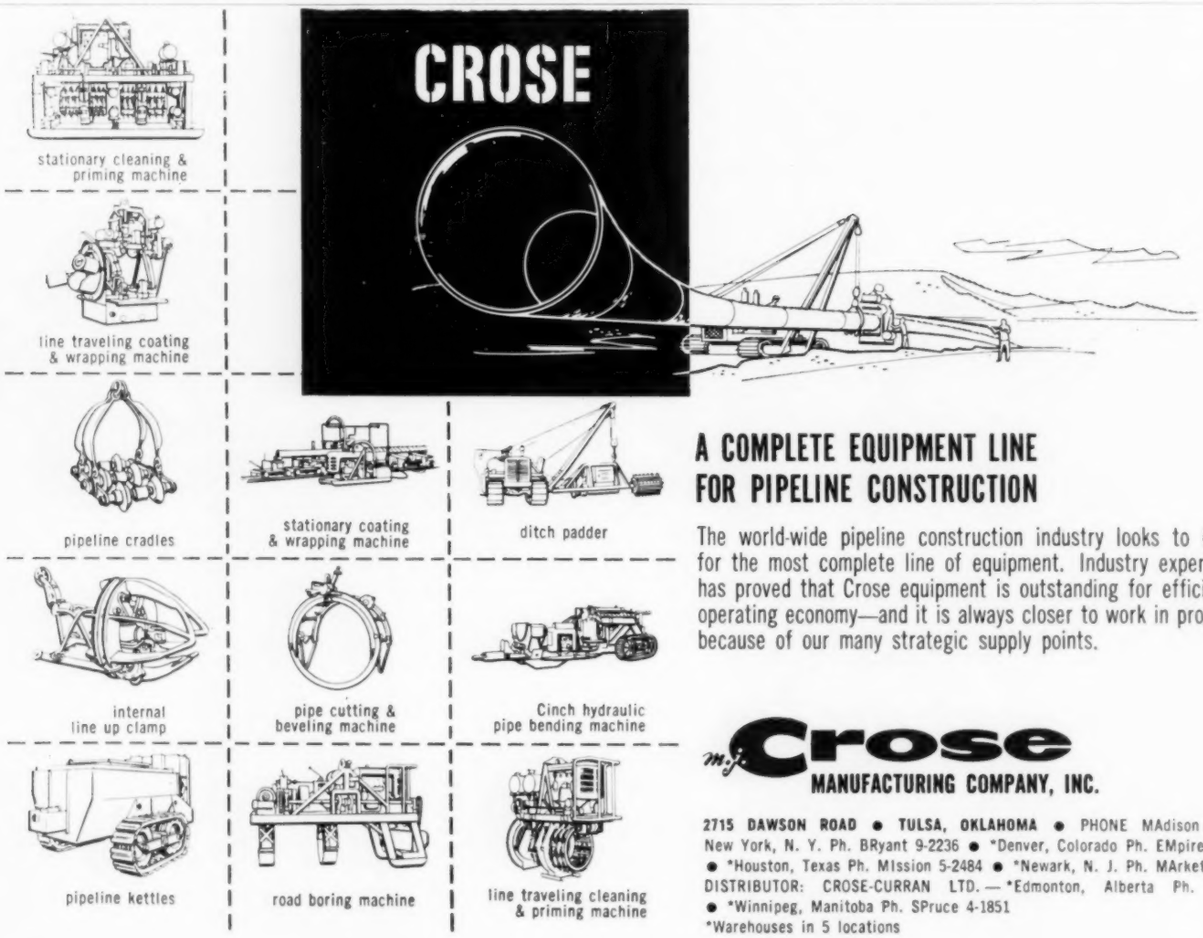
Among the independent holdings there are: E. W. Pauley of California; D. Vasser of New Orleans; Russell Cobb Jr. of Tulsa; and E. Ospina-Racines. They hold properties indicated on the map not identified with other independents.

Colombia is one of the few countries outside the United States which recognizes private oil property. Texas Ortega production comes from a private lease, and its 22,000 b/d Velasquez output is from a property owned in fee by Texas.

Landholdings of the operators and independents in Colombia cover now some 27 million hectares, or 66 million acres, which include applications for concessions, firm concessions, and private oil properties with recognized oil titles. The breakdown among the operators is as in Table 6.

In closing, it is worthwhile to mention that the current drilling activity—particularly wildcatting—may be due in large measure to legislation of the Colombian government aimed at stimulating oil developments in the country. The first is the depletion allowance granted to the oil industry as of 1955 and its regulations which, in turn, established the 50-50 net profits split for the oil industry by decree—now a worldwide norm; and it went even further by a 40-60 split—the latter in favor of the oil operators for oil developed in the Llanos region of Colombia at least 600 miles from tidewater and just south of Venezuela's Barinas oil basin, now under active development. The additional percentage in favor of the operators was to compensate for the gerater risks and huge investments required to find and develop at least one billion barrels of commercial oil in the Llanos of Colombia.

The second boon to the oil industry was a decree of June last establishing a more equitable exchange rate for incoming oil dollars than had prevailed. The industry sells annually to the Banco de la Republica some $30 million to carry out operations, which had been converted at pesos 2.50 per dollar; and now the oil industry receives pesos 5 per dollar, while the free market rate is around six— with a tendency of going higher. Of course, this devaluation, which had been in progress for sometime, has increased the cost of living, and the government decreed lately up to 15% increases and other social benefits, such as 4% of the payroll to be distributed as a family subsidy to employees, depending on the number of children per worker. The oil industry is No. 2 in bringing dollar exchange to Colombia—coffee being first. Last year coffee brought $386 million, and oil $28.5 million, of a total of $451 million of sales abroad. Oil contributed, therefore, 6.3% of the total dollar exchange acquired by Colombia last year. END



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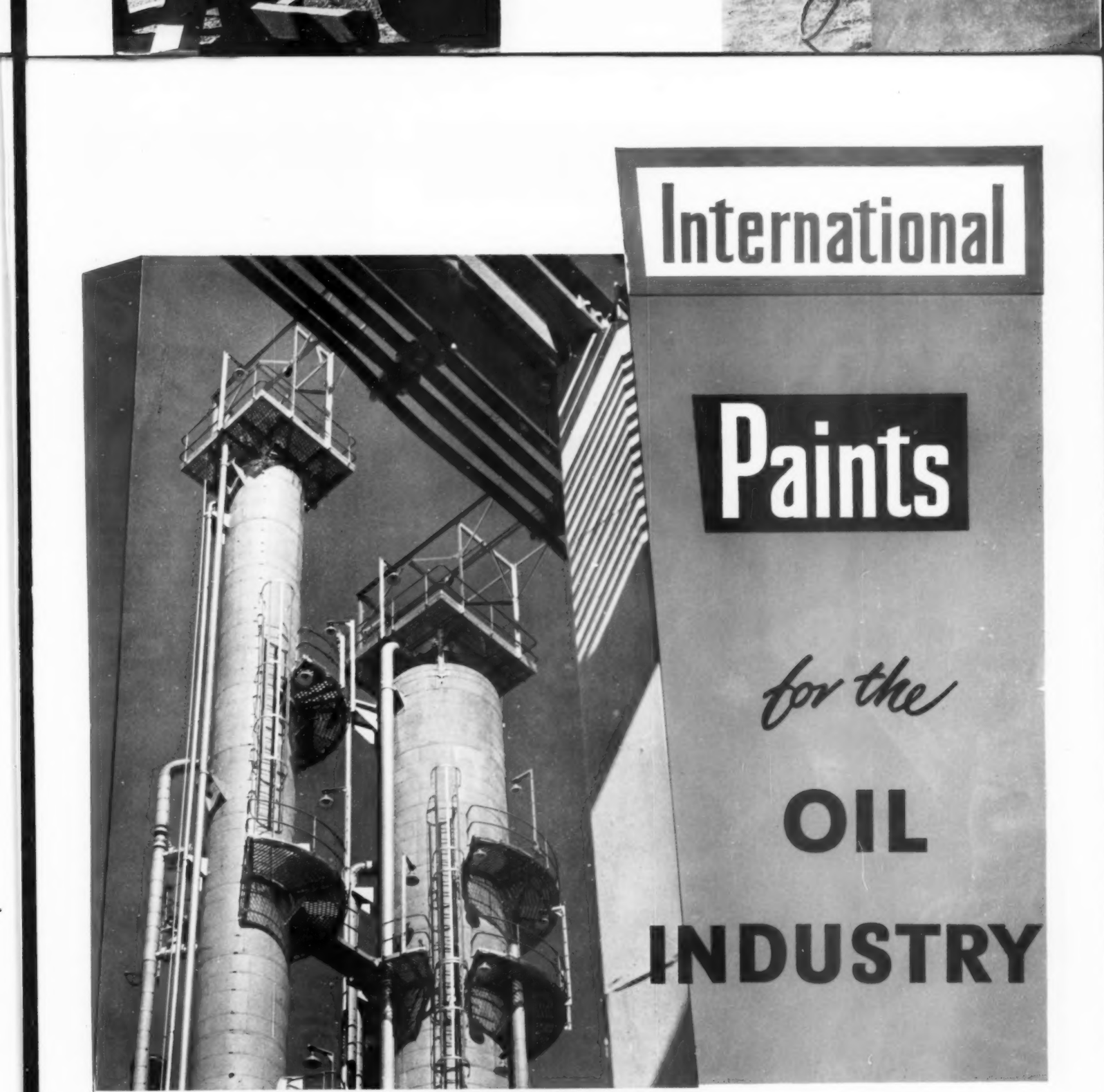

"Shell" Refining & Marketing Company Ltd: Part of the Platforming Unit, Shell Haven Refinery. (A Shell Photograph)

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Oil Company Staff Changes

ARTHUR O. DETMAR has been named president and general manager of Mobil Oil of Canada effective December 1. A vice president and director of the company since 1954, Mr. Detmar succeeds Fred H. Moore, who becomes coordinator of domestic producing operations and a member of the producing committee for Socony Mobile Oil Co. in New York.

CHARLES W. ALCORN, executive vice president of Falcon Seaboard Drilling Co., has been elected president of the Texas Mid-Continent Oil and Gas Assn. Mr. Alcorn formerly was an independent producer before joining T. N. Law in the formation of Falcon Seaboard in 1953.

FRANK C. SOMERS, has been appointed assistant manager of Esso Engineering's newly-established office in The Hague, Netherlands. Mr. Somers expects to assume his new duties Nov. 1. He will be accompanied to Europe by his family. During his company service he has traveled extensively, this past summer being assigned to a refinery project at Cartagena, Colombia. He also has had assignments in Canada and Venezuela dealing with refinery work and consultation programs.

RALPH A. CARDELLO has been appointed section head in the planning engineering division of Esso Research and Engineering Co.

H. D. Moore

H. D. MOORE has been elected a vice president of Sinclair Oil Corp. In his new position, Mr. Moore will be executive assistant to the executive vice president for operations. Among other duties, he will coordinate activities of refining, transportation, and production of interests newly acquired by Sinclair. He had been assistant general manager of wholesale sales for Sinclair Refining Co., manufacturing and marketing subsidiary of Sinclair Oil Corp.

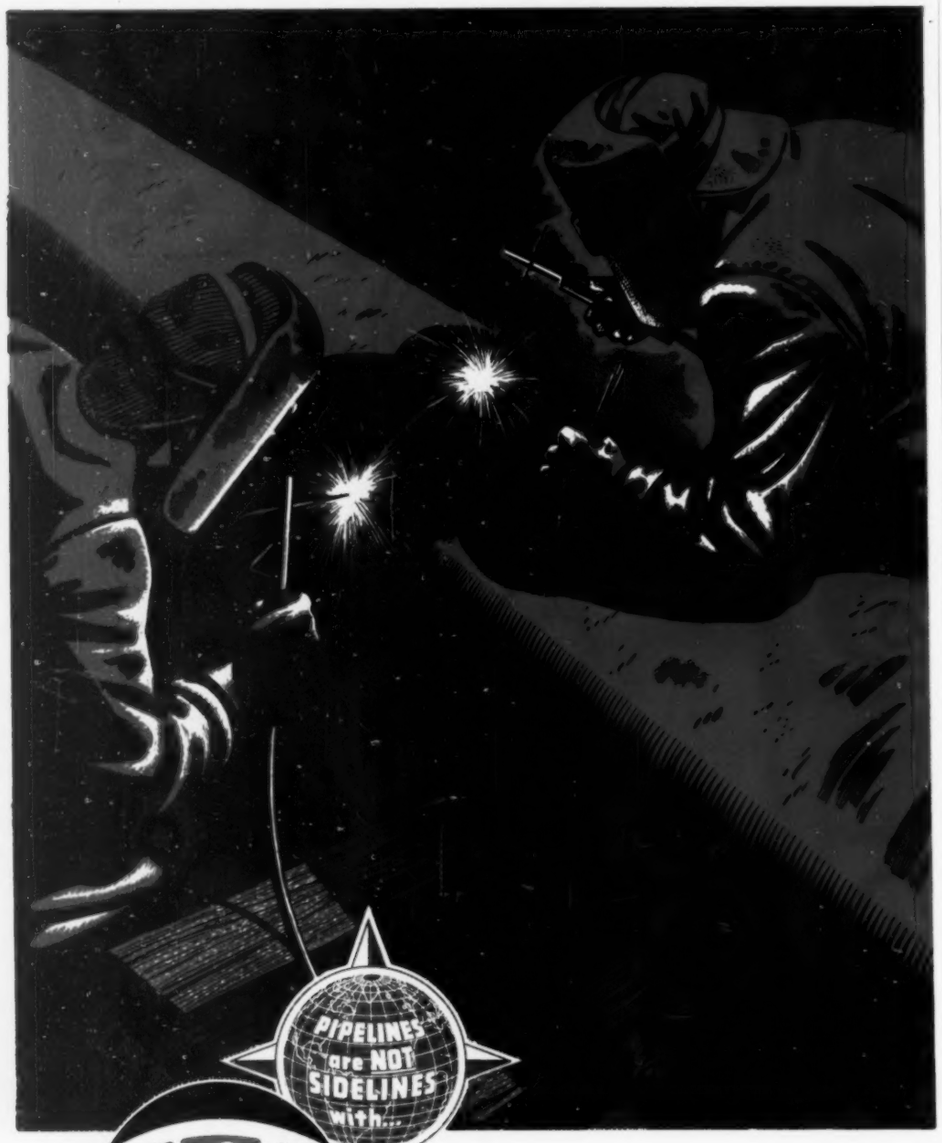
Before joining Sinclair in 1950, Mr. Moore was associated with the W. T. Waggoner Estate properties in Vernon, Texas, from 1933 until 1949, when he resigned as sales manager. He was next supervisory executive for Rock Island Oil and Refining Co., a subsidiary of Wood River Oil Refining Co., at Duncan, Okla., and then became general sales manager of Wood River, the parent company. The refinery and other properties of the Wood River company were acquired by Sinclair in 1950.

Landon B. Derby

L. B. DERBY has been appointed general manager of The Texas Co.'s foreign operations department (Western Hemisphere and West Africa). He succeeds A. W. Baucum, whose appointment as general manager of the foreign producing department (Western Hemisphere and West Africa) was announced recently.

STORRS J. CASE has resigned as Sun Oil Co.'s advertising manager. The department until further notice will be directed by Palmer D. McKay, assistant advertising manager.

CHARLES I. RATHGEB has been appointed vice president and managing director of operations of Canadian Comstock Co. Ltd. Canadian Comstock is a construction engineering firm specializing, among others, in process piping and manufacturing and petroleum construction. It has offices in Vancouver, Edmonton, Calgary, Winnipeg, London, Halifax, and Montreal, Canada.



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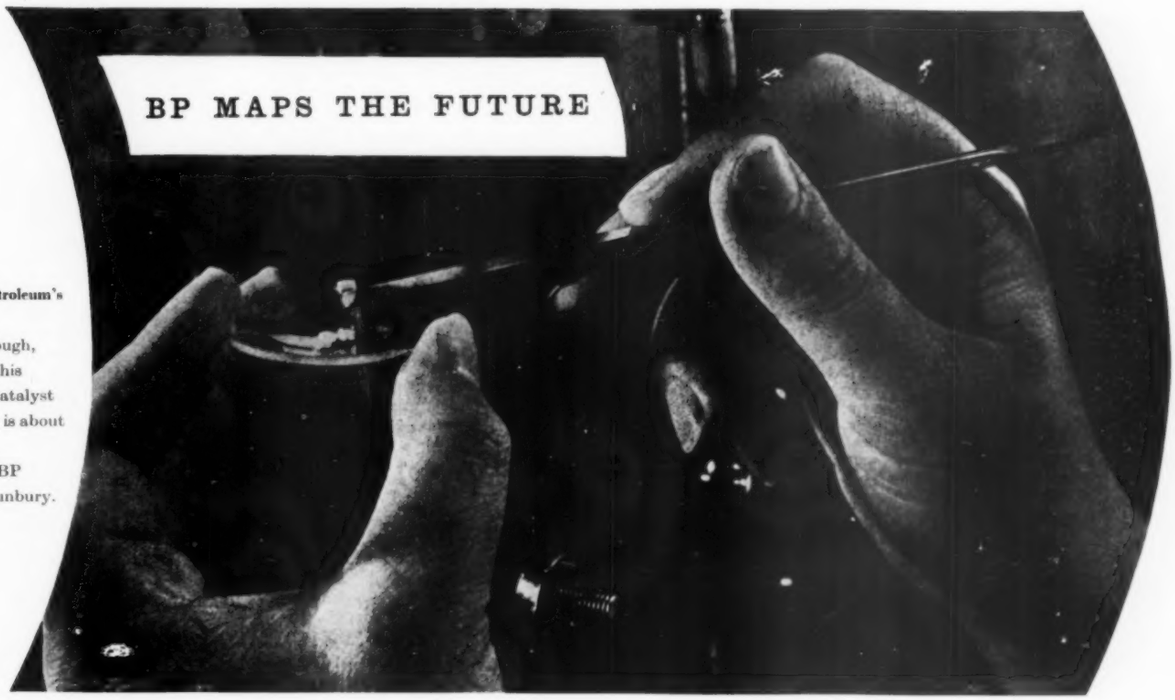

The story of British Petroleum's world-wide activities begins, naturally enough, here in Britain. In this picture a sample of catalyst for use in oil refining is about to be analysed in a spectrometer at the BP Research Station, Sunbury.

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In 1917 Sunbury Research Station began with one modest house. Now it occupies thirty-nine acres and is still expanding. Besides its laboratory and development work, Sunbury carries out the most exhaustive proving-tests of BP products and processes. The latest major addition to its resources is a motor fuels engine-test laboratory, where cars can be tested at speeds up to more than 100 m.p.h. under temperature and humidity conditions equivalent to the most extreme tropical climates.

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BP

G. B. (Mike) Ryan

George L. Lupfer

G. B. (Mike) RYAN, coordinator of commercial research development, The Standard Oil Co. (Ohio), Cleveland, has just been transferred to Houston, Texas, to serve as staff assistant to Gordon H. White, Sohio Gulf Coast Division Manager, in the production department. George L. Lupfer, succeeds Mr. Ryan as research coordinator.

JOHN F. RYAN has been named an acting section head in the chemicals development division of Esso Research and Engineering Co. Esso Research is the central scientific affiliate of Standard Oil Co. (N.J.).

DR. JOHN REHNER, Jr., has been named a section head in the products research division of Esso.

DR. JOHN C. HUNT has been appointed a section head in the chemicals development division of Esso. He had been a section head in an acting capacity for nearly a year.

JOHN F. JOHNSON was also named a section head in the chemicals research division of Esso Research and Engineering Co. He had been in the firm's chemicals development division.

J. WHITTAKER has been appointed assistant manager, catalytic cracking department, Montreal refinery, Shell of Canada. Formerly on special assignment with the dispatching department at Montreal refinery, he joined Shell in England in 1944 and came to Shell of Canada in 1952 as technologist.

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A. E. Pecore

William S. Spangler

A. E. PECORE, formerly vice president, has been named president of Humble Pipe Line Co., Houston, Texas. He succeeds O. Q. Lomax, president of the company since 1950, who retired September 1.

William S. Spangler replaces Mr. Pecore as vice president. P. D. Phillips, Jr., has been promoted to general superintendent, and has been named a director of the company.

RICHARD E. LAUTERBACH has been named to succeed Thomas P. Simpson, vice president and director of manufacturing for General Petroleum Corp., according to Robert L. Minckler, president. Mr. Simpson has moved to New York, where he will become general manager of manufacturing of Socony Mobil Oil Co. Inc. Both changes were effective October 1.

ROBERT F. LEARY has been appointed an assistant director in the chemicals research division of Esso Research and Engineering Co. He will be responsible for the administration of certain exploratory research work in petrochemicals. His previous work has been in connection with research on steam cracking and a wide variety of other refining processes.

DR. NEIL F. BAUMGARTNER has been named a section head in the chemicals research division of Esso Research and Engineering Co.—the central scientific affiliate of Standard Oil Co. (N.J.)

Kerryn King

Thomas D. Durrance

KERRYN KING has been appointed general manager of the industrial and public-relations department of The Texas Co. He was formerly assistant general manager and director of public relations. He was succeeded as director of public relations by Thomas D. Durrance, who has been supervisor of editorial services.

Robert T. Kenney and Thomas F. Brawner were named assistants to the director of public relations, with headquarters in Los Angeles and Houston, respectively.

JAMES H. R. CROMWELL of Washington, a one-time USA ambassador to Canada, has been elected president of Great Sweet Grass Oils Ltd., Toronto. He was elected by a new board of directors, including Frederick Malone of Toronto; Thomas I. Anderson, Port Credit, Ont.; Robert B. Berger, Teaneck, N.J.; George Brussel Jr. of I. D. Robbins and Grover Whalen—all of New York. Announcement of the election was made at a meeting of shareholders of Great Sweet Grass in Toronto. The new president served as USA minister to Canada from January to May 1940. He succeeds retiring president Colin Campbell.

THOMAS G. WISE, has been elected a director of Husky Oil Co. to fill a vacancy occasioned by the resignation of Lawrence W. Lee, of Calgary, Alberta, Canada. Mr. Wise joined Husky in February 1956 as President of H. Earl Clack Inc., Husky's marketing subsidiary.

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International News and Notes

Alaska Discovery Well

Details on Richfield discovery well (Swanson River unit) on Kenai peninsula, Alaska, include: flowed 900 b/d of 33 API gravity oil, plus 122,000 cu ft of gas through 1½-in. bean; production was from 11,150 ft to 11,215 ft. Total depth is 12,384 ft; 5½-in. casing set at 12,000 ft. It is now producing 360 b/d cutting 0.2% through 9/64-in. bean, with 900 psi tubing pressure and 50,000 cu ft of gas. This is the first producer in the area. Richfield has 89½% interest; Union Oil and Ohio Oil share remainder. A second well is scheduled about two miles south.

Algeria—New Pipeline Begun

Work has started on a pipeline from Hassi Messaoud in south-central Algeria to Touggourt, on the Algerian railroad. The line will be extended by 1960 to Bougie, on the Algerian coast.

Search on Sardinia to Begin

Share of the German firm Wintershall AG in the joint Sardinian government company (SAIS) is reported to be 70%—with SAIS 30%. Wintershall will begin exploration shortly on 9,000 square miles of the island.

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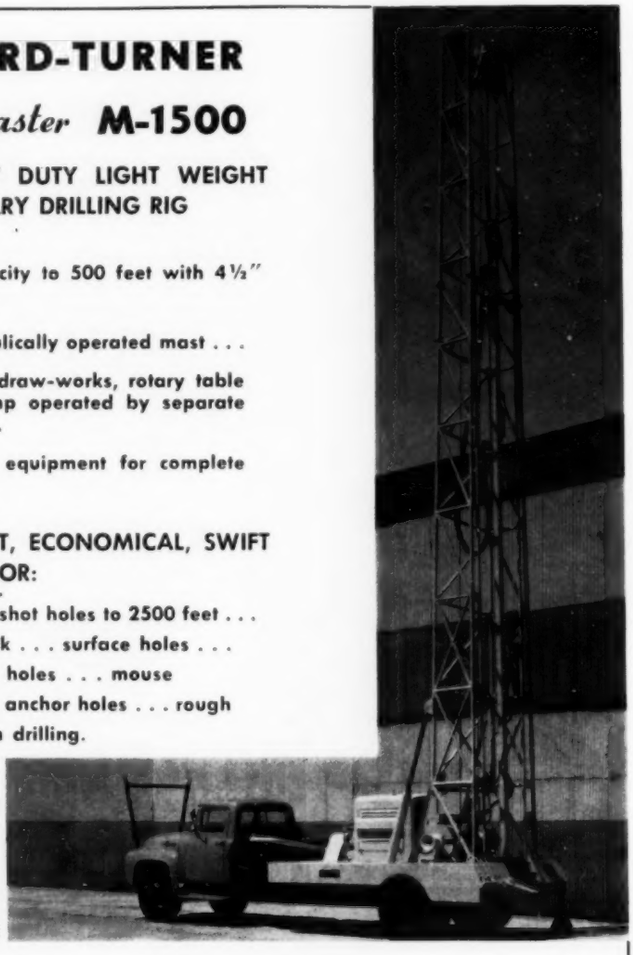

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Portable Unit Measures Distances

An instrument claimed to exceed the capabilities of all established methods of distance measurement has been acquired by the Collins Construction Co., submarine pipeline specialists of Port Lavaca, Texas. The device applies a refinement of radar to the job of measuring distances. Known as the Tellurometer, the system is the culmination of years of research and development by the South African Council for Scientific and Industrial Research. Consisting of one master unit and two remote or "slave" units, the system operates in the 10-cm wavelength region and measures the travel time of radio waves over the length to be determined with an accuracy of a fraction of a millimicrosecond.

Accuracy and simplicity of operation are two of the more important features of the system. Of rugged construction, the instruments are light, portable, easily erected, and dependable—allowing them to be used for long periods without undue problems of maintenance. The entire instrument pack weighs 57 lb. Measurements can be made by day or by night, and visibility is immaterial. The probable error of the system is about three parts per million, plus or minus 2 in., on lines of any length up to 35 miles. This error would amount to less than 1 ft at distances up to 20 miles.

Only four of the units have been distributed in the United States thus far. Collins Construction Co. was the first construction firm in the United States to purchase a Tellurometer system.

Italy-ENI Activity Reviewed

At the International Meeting on Hydrocarbon Resources, at Piacenza, from September 12 to 14, ENI chairman, Enrico Mattei disclosed results of the Italian nationalized group in oil and natural gas.

Drilling activity: in 1956, 138 wells were to be completed—57 exploration and 81 development; more than 650,000 ft were drilled. In the first seven months of 1957 drilling surpassed the 650,000 ft.

In June 1957 AGIP-Mineraria put to work the first deep drill, built by the Nuovo Pignone on Ideco license. A turbodrill of French make (Neyrpic) has been tested in Sicily with good results.

Discoveries: natural gas was found in 1956 at Selva and Manerbio (Po valley). The fields have been satisfactorily developed in 1957; in 1957 an interesting gas discovery took place at Casteggio (southwest Po valley). The first well drilled yielded 70,000 to 80,000 cu m per/day. Crude oil has been found in modest amount at Busseto near Panama. Quantitatively more interesting the results in Abruzzi region (central Italy), near the Adriatic coast, where several wells have been completed near Alanno. Overall production of crude from this area is now of 1,000 b/d.

In Sicily oil was found at Gela in 1956. The development of this field is being actively pushed. Very heavy asphaltic crude is now recovered by pumping from five wells. In September 1957 a flowing well near Noto gave about 100 b/d of crude.

Overall production of oil and gas from the ENI group is still progressing. In 1956, 4,159 cu m natural gas were produced; in the first seven months of 1957 2,647 million cu m natural gas and 700,000 bbl of crude oil plus natural-gas liquids and condensables.

Pipelines: The Po valley network has not been substantially enlarged. Its total length reached 4,335 km at the end of 1956. During the Suez emergency peak load of 17 million cu m per day could be reached.

ENI programs for the near future, beside the development of domestic hydrocarbon resources, call for the establishing of an atomic-energy production, and the exploration and exploitation of petroleum resources abroad. Foreign activity of ENI started in the Sinai peninsula (Egypt) where the fields of El Belayin and Abu Rudeis produce about 25,000 b/d, and will be continued in Iran, after the favorable stipulation of ENI-NIOC deals.

Neutral Zone Production to Germany

A contract for supply of 30,000 b/d has been signed by American Independent Oil Co. with a German company, Erdoelwerke Frisia AG, a marketing company formed earlier this year by G. Duttweiler. The company will build a $15 million refinery at Emden to take the crude. Ralph M. Parsons Co. is the constructor.

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Erle Palmer Halliburton

HALLIBURTON FOUNDER PASSES

After a long illness, Erle Palmer Halliburton died in Los Angeles, Calif., at the age of 65. A pioneer in oil-well cementing, in 1924 he founded Halliburton Oil Well Cementing Co., Duncan, Okla.—with an initial capital of $350,000 and 56 employees. It since has grown into one of the world's largest oil service organizations, with annual sales amounting to $176 million, its products and services offered all over the world—in 23 foreign countries, 284 fully equipped service centers, and a company fleet of more than 6,000 vehicles.

Among Halliburton contributions were the jet mixer, the first practical well-depth measuring device, and numerous improved procedures in fracturing, formation testing, and other oil-well services. Mr. Halliburton was the holder of more than 50 patents. He served as president of the company from its formation until 1947, when the position of chairman was created—a post he held until his death.

Mr. Halliburton was born on a Tennessee farm which he left at the age of 14 for a job in industry. In the next nine years he worked in various construction and transportation jobs and served two hitches in the United States Navy. In 1916 he made his first contact with oil when he joined the Perkins Cementing Co. in California.

By 1919 he had moved to the booming fields in North Texas where he served the industry as a drilling consultant and later as a cementing contractor. He developed this business in various Texas fields before moving to Duncan, Okla., in 1921. The Halliburton Oil Well Cementing Co. was organized in 1924.

During the final 30-odd years of his life, Mr. Halliburton engaged in a number of enterprises outside of the service field occupied by the company bearing his name. In 1929, for example, he organized an air line which was later sold to American Airlines after flying two million miles. He mined gold, engaged in large scale farming and ranching, developed hydroelectric projects, made light-weight aluminum luggage and manufactured specialized parts and equipment for the Government.

Early this year Oklahoma honored him by election to the Oklahoma Hall of Fame.

WILLIAM H. PINCKARD

William H. Pinckard, retired chairman of the California Texas Oil Co. Ltd., New York, died in Palo Alto Hospital after a brief illness. He was 63.

Mr. Pinckard who retired in April after 40 years in the international oil industry, started his career with The Texas Co. in Port Arthur in 1917 and subsequently spent more than 20 years in the Far East and other foreign posts. During World War I he served as a captain in the 1st Phillippine Division.

In 1936, Mr. Pinckard participated in the formation of the Caltex Group. A year later became manager of the Caltex Asia division in India, directing the entry of Caltex into that market and organizing Caltex (India) Ltd.

He went to New York in 1940 as a vice president of California Texas Oil Co., Ltd., became president of that company in 1946, and chairman in 1950.

Logan D. Campbell

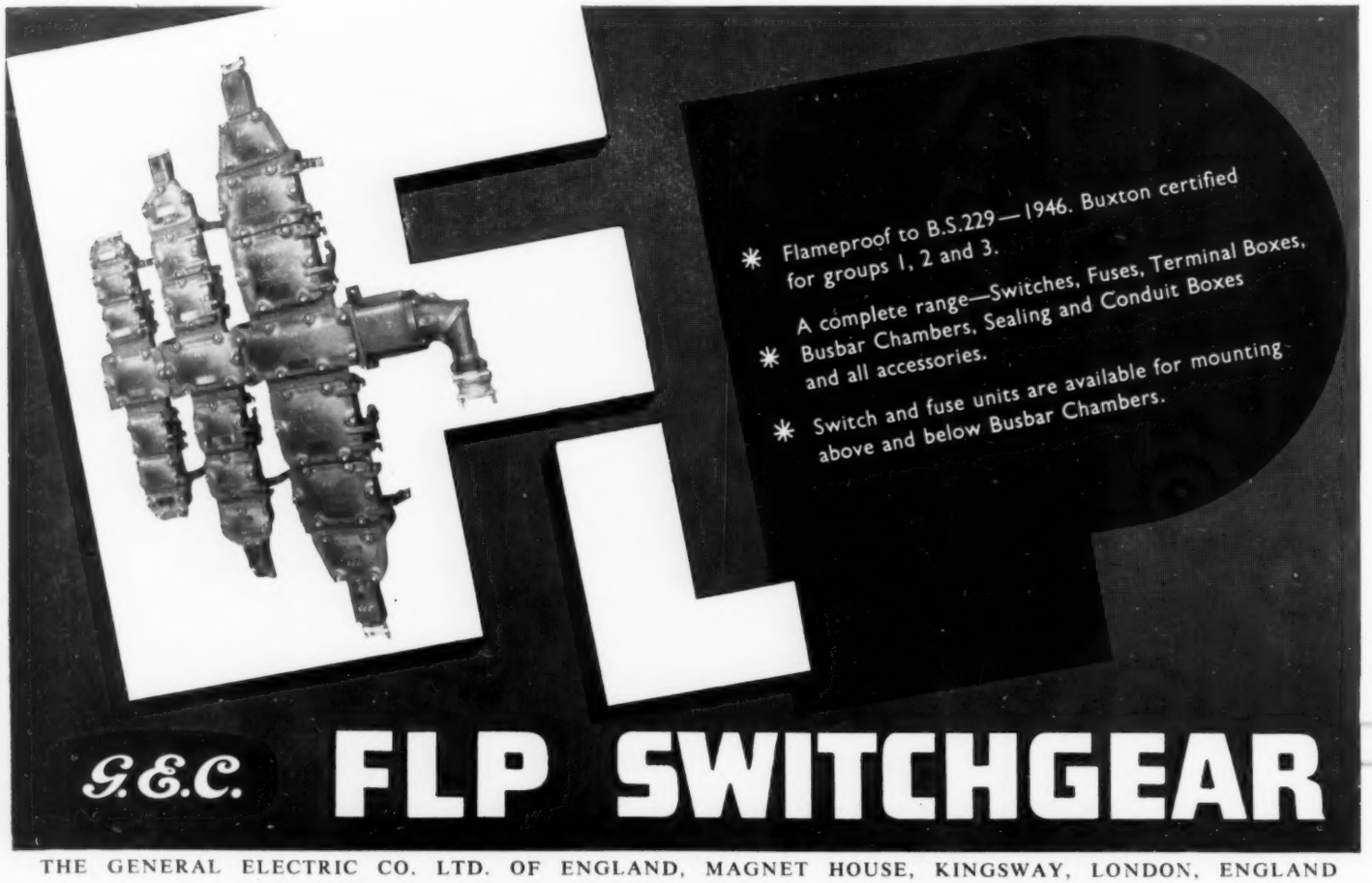
Logan D. Campbell Heads Halliburton

Logan D. Campbell, has been elected chairman of Halliburton Oil Well Cementing Co., to succeed Erie P. Halliburton, founder, who died October 13. Mr. Campbell formerly was vice chairman. Company directors also elected Ray O. Shaffer, president of a Halliburton subsidiary, Welex, Inc. as a member of the Halliburton board. All other officers and directors were reelected.

Sun Suit Settled

The following statement has been jointly issued by Sun Oil Co. and World Tankers Corp:

"Sun Oil Co. and World Tankers Corp. are happy to state that the sincere differences of opinion which had arisen between them and which led to litigation both in the United States and in England have been amicably resolved, and that they have resumed contractural relations on terms which are mutually satisfactory."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Oil in the French Union

Saharan crude accounted for the downfall of the Bourges-Maunoury regime, when it tried to push through the French National Assembly a "loi-cadre" granting some measure of home rule to Algeria, and to the 8-million-plus Moslem Algerians voting rights equal to those of the 2 million European-descended settlers.

The Paris financial weekly *Finance* reckons that the country would get, by 1960, 75 million barrels out of Hassi-Massouad and 37.5 million from Edjele. These shipments, plus 37.5 million barrels of Gabon crude would result in the saving of $400 million of dollar-zone crude representing one-third of the country's chronic commercial balance deficit. *Finance* goes on to venture that, within seven years, the oil-backed franc would be turned from a soft into a hard currency.

French circles should know better. First, the 70-82 million barrels of Gabon's known reserves seem hardly capable of sustaining a 37-million-barrel yearly production.

In regard to the Sahara, even the usually most sanguine government-controlled Bureau des Réchérches de Pétrole (BRP) expects to get out of all local sources of production 75 million barrels by 1961, with a 20% yearly increase in output thereafter. But such forecasts are fraught with a very big "if"—IF Algeria were pacified by that time.

The crude is right there at Hassi-Massouad. The results of I OM, I MD, and 2 MD tend to show that the estimates of local reserves must be upped from an initial 750 million barrels to 2,225 million. The field may well contain 7,500 million barrels. It is already valued at well over $200 million at the Paris stock exchange. But the main problem is not to tap the crude, but to move it off to France across a country torn by internecine strife. Such circumstances account for the decision of the Compagnie de Raffinage en Afrique du Nord to build its refinery in the immediate vicinity of Hassi-Massouad, instead of Algiers as was originally planned.

BRP has already proved wrong in one respect. Some 10 months ago, it crystal-gazed that 3,700,000 bbl of Saharan oil would reach the French refineries in 1957. Only at the beginning of October did construction start on the temporary 125-mile 6-in. pipeline from Hassi-Massouad to Touggourt. Even if were to be put in operation at the very start of the construction, it could only transport a shade under 2 million barrels in 1957. This amount represents one-fourth of the limited evacuation capacity of the railway line from Touggourt to Bougie, on the western Mediterranean.

The planned big pipeline is to cut across two rugged, rebel-infested ranges of mountains. Pumping stations, costing some $8 million apiece, will have to be provided every 60 to 90 miles. Here's the Achilles heel of the whole project. It would be relatively easy to repair the sabotaged line itself, but the Syrian precedent here is to show that it takes months to put into running order again a methodically wrecked pumping station. The FLN is trying to infiltrate Moscow-trained sabotage undercover agents among the 4,000-strong personnel engaged in Saharan oil activities, and already the Saharan thermal power station at Laghouat has been blown up by such sabotage.

The prospective Edjele-western Mediterranean 500-mile 12-in. or 16-in. pipeline will traverse a far less rugged and densely populated country. Thus, it would be far less liable to sabotage, even across the desert French-controlled territory from Edjele to Ghadames.

The anxiousness of the operator to lessen such risks accounts partly for the choice of terminals at both Libya's Zoara port and Tunisia's Zarzis so as to interest, through the payment of right-of-passage and loading royalties, both countries in the security of the pipeline skirting their borders with Algeria. Moreover, a Libyan port will permit Shell to evade the flag-monopoly legislation, requiring its moving off the crude to the French refineries exclusively aboard French or Tunisian-registered tankers.

The major stumbling block here will be the site of the refineries. Under the terms of the 1947 oil agreement, France undertook to build such facilities on Tunisian territory, if oil were struck here in commercial volume. As the Franco-Tunisian relationships are currently strained, the latter could be relied upon to grant the right-of-passage only against the fulfillment of the above provision.

Against such a background—and their commitments in the Middle East—it is easy to grasp why the American Big Five have refrained from joining the queue for the 24,000 square miles of acreage released by SN Repal and CFPA. This acreage has been equally divided into eight 2,500-square-mile concessions, to be granted to as many newcomers.

These perhaps too strict limitations in areal extent have induced Franco-Wyoming and Conorada to withdraw their joint application. The French government granted, March 30, 1957, a block of four concessions immediately to the north of Edjele to a newcomer, the Compagnie d'Explorations Pérolières, in preference to the SN Repal-CFPA and to the CREPS-CPA which had applied for them. CEP is to secure the fifth adjoining Reggan concession. Worthy of note is the operator's undertaking to release to other ventures two of its four concessions, covering 12,850 square miles, after a lapse of two years. Three new French ventures have received the whole block from the lessee, in which already had been carried out an extensive surface reconnaissance campaign, followed by core-hole drilling for geological information.

Among the CEP's shareholders are the French government (57%); Finarep (10%); Cofirep (3%); British Petroleum (3%); while 22% of its 36 billion francs capital are owned by individual shareholders. CEP is reputed to have close links with ENI, the Italian State-controlled venture, which has begun to show an interest in Morocco, Iran, and Egypt. CEP already operates the St.-Estèphe concession in the basin of Aquitaine, and has applied for some of the acreage released here by the SNPA. It controls quite a few subsidiaries, drilling ventures, *inter alia*.

After the Compagnie Universèlle du Canal de Suez, controlling Ofirep, the Soc. Financière de Transport et d'Entreprises Industrièlles, known as Sofina, has appeared on the Saharan scene. This powerful Belgian holding, with 43% of its large capital invested in the USA, is participating for 25% in Eurafrep, set up at a capital of 6 billion francs jointly with the Banque Lazare Frères, the Banque d'Indochine, and the Compagnie Française du Sahara. It is rumored that ex-Premier René Mayer of France has resigned the chairmanship of the coal-steel pool to become the president of the board of both Sofina and Eurafrep.

Another joint venture is Forafrance, owned 45% by Sofina—the balance going to the Banque Lazare Frères, the Banque d'Indochine, Chargeurs Réunis, Péchelbronn, Soc. des Grands Travaux de Marseille, and the Soc. d'Entreprises de Dragages et Travaux Publics. With the technical assistance of the American Brown Drilling group, Forafrance is to contract for drilling jobs both in France and overseas. For a start, it can rely on two Ideal 50 rigs kept busy in France, and two Ideco H525 affairs, operating in the Gabon.

The same above ventures, excepting Sofina, founded the Compagnie Auxiliaire du Pétrole, mainly for purchasing a 25% interest in Brown Drilling, of which Sofina recently secured the control. END

INTERNATIONAL NEWS AND NOTES

Hunt for Oil in Tunisia

Conorado Petroleum Corp. (joint Amerada, Continental, and Ohio Oil) has been authorized to search for oil in southern Tunisia, and will spend initially $952,381 on exploration. Previously it had been reported that Conorado had applied for a 28,000-square-kilometer concession in southwest Tunisia.

Italians Apply in Jordan

Two Italians—Dr. Cugnasca, mine owner of Milan, and Luigi de Fifo, lawyer and researcher representing industrialists—have applied for a concession in one-third the area of Jordan. The country now is divided into three exploration areas. Pauley is drilling in one; and Zimiry of Guatemala has applied in the second.

New Refinery for Italy

G. Volpato & Co. of Milan will build a refinery at Talamone, on the Tuscan coast. Whether to develop Talamone's small port or construct an offshore loading platform has not as yet been decided.

$127 Million for Sahara Search

A study by the Ministry of Algeria indicates France currently is spending $52.3 million on finding new oil in the Sahara. By the end of this year expenditures by France for research and production in the desert should reach $127,131,000. Production will reach at least 160,000 b/d by 1960—possibly even as much as 280,000 b/d—according to the study. As to natural-gas production, the study predicts it "can completely cover Algeria's needs whatever the development of its consumption."

UK Consumption Declines

Due largely to the Suez crisis, consumption of oil products in the United Kingdom during the first half of 1957 declined almost 9% below the corresponding 1956 period. Gasoline fell 17%, kerosine 10%, gas-diesel oils 13%, and fuel oil 4%.

90,000 B/D Netherlands Refinery

Esso's new refinery near Rotterdam, scheduled for early 1960 completion, will have a capacity of 90,000 b/d instead of the 30,000 to 40,000 b/d previously reported.

Oil Show in Southwest France

A show of heavy oil has been found in a well at 4,460 ft by Soc. Natl. des Pétroles d'Aquitaine (SNPA), 35 km northwest of the Lacq field in southwest France.

Italy's Gas Reserves

Natural-gas reserves in Italy are officially estimated at 135 billion cubic meters—about 27 years' production at the current rate of some 5 billion cubic meters.

Sweden's Oil Consumption

Sweden's consumption of oil products rose to more than 4.7 million metric tons (94,000 b/d) in the 2nd half of 1956 from 4.4 million tons in the 1st half, but declined to little more than 4.5 million in the 1st 6 months of 1957 due mainly to the Suez crisis. 1st half 1957 consumption of heavy fuel oil was 1% lower than in the same 1956 period, but of most other products it was higher—that of gasoline by 8%, of gas oil by 4%, and of diesel and light fuel oils by 7%.

Sweden's Refinery Raises Capacity

Capacity of the refinery at Nynäshamn, near Stockholm, of Nynäs Petroleum (Axel Johnson & Co.) will be raised to 1.8 million metric tons a year (about 36,000 b/d) from 700,000 tons (14,000 b/d).

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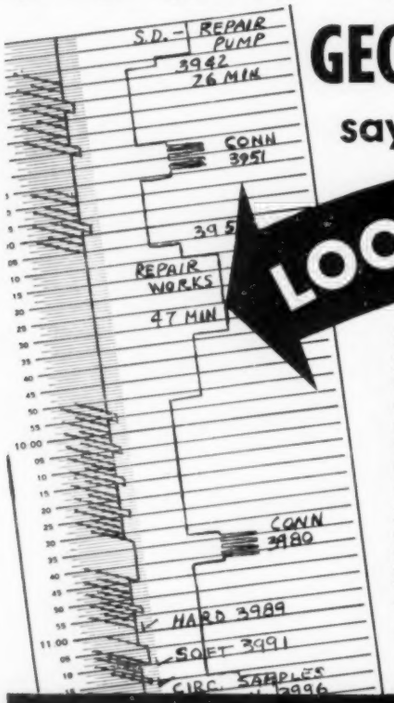

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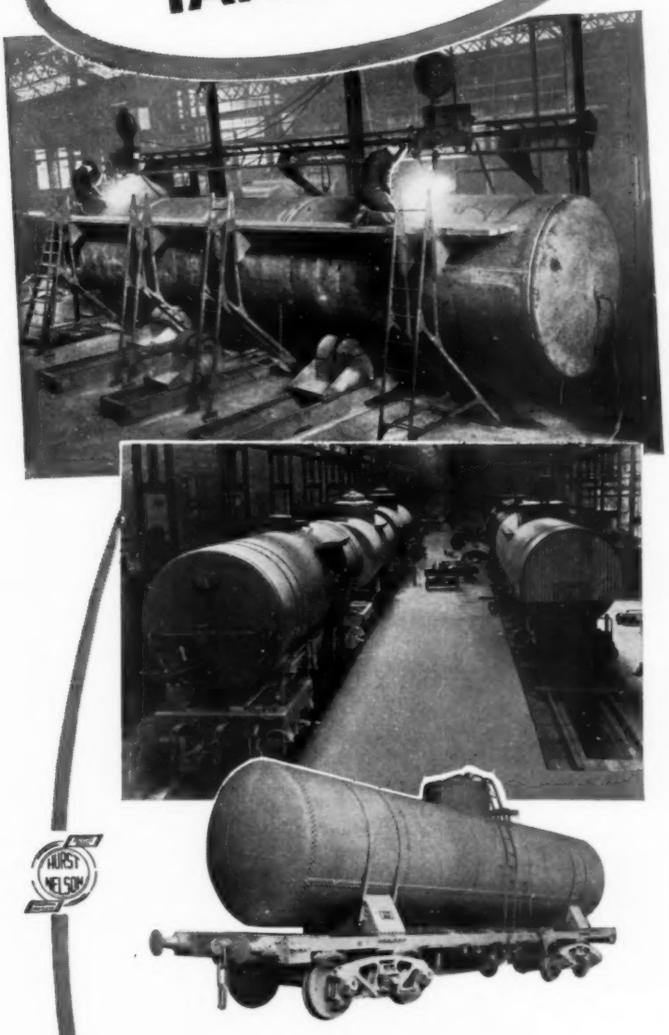

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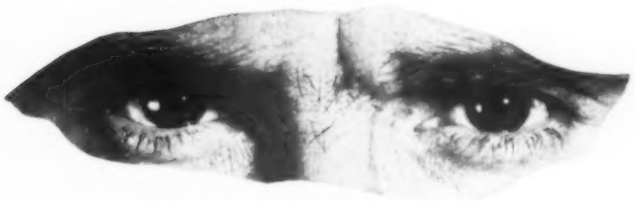

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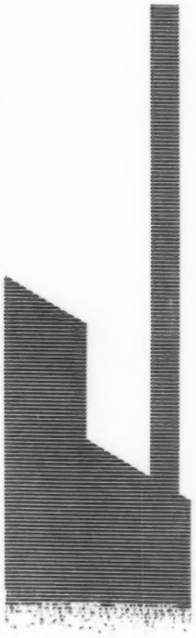

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O-C-T has earned its reputation for good service by dependable performance in the field year after year.

We can only guess how many thousands of dollars have been saved for the oil industry by prompt O-C-T service. But we do know this: Oil Center Tool Company maintains the largest service organization in the field to help you set and service wellhead assemblies.

It makes a good combination you can count on . . . the most dependable equipment plus the best service in the field.

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